Original Research Article

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Comparison Between Endoscopic and Percutaneous Approach of Obturator Nerve Block in Case of Transurethral Resection of Bladder Tumour (TURBT)

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Abstract

Background: Bladder cancer is the second most common malignancy of the genitourinary tract. During transurethral resection of bladder tumour (TURBT), stimulation of the obturator nerve, particularly in tumours located on the lateral, posterolateral, or inferolateral walls, may trigger involuntary adductor muscle contractions ("obturator jerk"), increasing the risk of bladder perforation and incomplete tumour resection. This study compared the efficacy and safety of endoscopic versus percutaneous obturator nerve block (ONB) in controlling the obturator reflex during TURBT.

Methods: This prospective quasi-experimental study was conducted from January 2017 to December 2018 in the Department of Urology, Sir Salimullah Medical College, Mitford Hospital, Dhaka Medical College Hospital, and selected private hospitals in Dhaka, Bangladesh and included 100 TURBT patients equally divided into two groups: Group A (endoscopic ONB) and Group B (percutaneous ONB). Outcomes—obturator jerk suppression, tumour resection completeness, bladder perforation, operative time, and local complications—were compared using the unpaired Student's t-test and chi-square test, with $P < 0.05$ considered statistically significant.

Results: Endoscopic ONB achieved higher obturator jerk suppression (86% vs. 78%), shorter operative time (56.4 ± 11.6 vs. 68.1 ± 13.2 min, $P < 0.001$), and fewer local site complications (0% vs. 30%, $P < 0.05$). No bladder perforations occurred in Group A, compared to 6% in Group B.

Conclusion: Endoscopic ONB is a safer, more efficient, and more reliable technique for minimising obturator reflex during TURBT compared to the percutaneous approach, offering improved surgical outcomes and patient safety.

Keywords: Bladder cancer, TURBT, obturator nerve block, endoscopic ONB, percutaneous ONB, obturator reflex

Introduction

Bladder cancer represents a major global health burden as the second most prevalent genito-urinary malignancy, with a disproportionate male predominance accounting for 7% of new male cancer cases versus 2% in women.[1] Transurethral resection of bladder tumor (TURBT) remains the gold standard procedure for both diagnosing and treating bladder tumors, irrespective of whether they are superficial or muscle-invasive.[2] By the way, despite its critical role, TURBT is associated with several potential complications. While bleeding is a common occurrence, bladder perforation stands out as a more serious concern, with an incidence ranging from 1% to 6%.[3] This risk is particularly heightened for tumors located on the lateral wall of the bladder, primarily due to a phenomenon known as the 'obturator jerk'.[4] The obturator jerk manifests as an abrupt, involuntary contraction of the thigh adductor muscles, triggered by the electrical stimulation of the obturator nerve during electrocautery. This nerve, originating from the L2-L4 segments, runs in close anatomical proximity to the infero-lateral bladder wall, prostatic urethra, and bladder neck.[5] Bladder distension with irrigation fluid further increases the nerve's susceptibility to inadvertent stimulation, thereby eliciting the characteristic jerk.[6] Unfortunately, conventional strategies like general anesthesia or modifications to current frequency and inactive electrode placement have largely proven ineffective in reliably preventing this reflex.[2] Accordingly, obturator nerve block (ONB) has emerged as a crucial preventative strategy. Over the past decade, various ONB techniques have been developed. Percutaneous approaches, sometimes guided by nerve stimulators, have demonstrated success rates around 90.5%.[7] More recently, endoscopic methods, involving the direct injection of a local anesthetic into the bladder wall under visual guidance, have been reported to have high efficacy. Alamgir et al. found 96% effectiveness with the endoscopic approach compared to 84% for the percutaneous method,[8] while Rahman et al. reported 93% effectiveness in inhibiting the obturator jerk via endoscopic injection.[9] Despite these promising results, a direct comparative appraisal of outcomes between percutaneous and endoscopic ONB, particularly within the specific context of Bangladesh, where TURBT procedures are frequently performed, remains limited. Percutaneous techniques carry inherent risks such as obturator vessel injury and can be technically challenging. While endoscopic blockade offers direct visualization and speed, concerns exist regarding potential partial or incomplete nerve block due to impeded anesthetic penetration through a thicker bladder wall. Addressing this knowledge gap is paramount for optimizing TURBT safety. Therefore, this prospective interventional study was designed to compare the outcomes of obturator nerve block achieved via endoscopic and percutaneous approaches during TURBT, hypothesizing that the endoscopic approach will demonstrate superior efficacy.

Methods

This prospective quasi-experimental study was conducted from January 2017 to December 2018 in the Department of Urology, Sir Salimullah Medical College, Mitford Hospital, Dhaka Medical College Hospital, and selected private hospitals in Dhaka, Bangladesh. A total of 100 patients undergoing transurethral resection of bladder tumour (TURBT) for lesions in the lateral, posterolateral, or inferolateral walls were recruited through purposive sampling and allocated equally into two groups: Group A (endoscopic obturator nerve block, ONB) and Group B (percutaneous ONB). 50 patients were included in each group to ensure robustness. Eligible participants had tumours in the specified bladder regions. Exclusion criteria included patients with cardiovascular or neurological disorders, hepatic or renal impairment, local infection, lignocaine allergy, abnormal coagulation, and extreme BMI. Written informed consent was obtained, and all procedures were performed under spinal anaesthesia. In Group A, 10 ml of 2% lidocaine was injected into the posterolateral bladder wall under cystoscopic

guidance. In Group B, ONB was performed percutaneously via the inguinal approach using a 25-G spinal needle. TURBT was performed with a 26 Fr resectoscope, monopolar cautery, and 1.5% glycine irrigation. The primary outcome was the incidence of obturator jerk; secondary outcomes were tumour resection completeness, bladder perforation, operative time, and local complications. Ethical approval was obtained from the Ethical Clearance Committee of Sir Salimullah Medical College, Mitford Hospital.

Statistical Analysis

Data were analyzed using Microsoft Excel 2010 (Microsoft Corporation, USA) and GraphPad Prism 2017 (GraphPad Software, Inc., USA). Continuous variables (e.g., age, operative time) were expressed as mean ± standard deviation (SD), and compared between the two groups using the unpaired Student's t-test. Categorical variables (e.g., occurrence of obturator jerk, tumour resection status, bladder perforation, local complications) were presented as frequencies and percentages, and compared using the chi-square (χ^2) test. A two-tailed *P*-value of less than 0.05 was considered statistically significant. Tubectomy was performed with a 26 fr resectoscope, monopolar cautery, and 1.5% glycine irrigation. The primary outcome was the incidence of obturator jerk; secondary outcomes were tumour resection completeness, bladder perforation, operative time, and local complications. Ethical approval was obtained from the Ethical Clearance Committee of Sir Salimullah Medical College, Mitford Hospital.

Results

Table 1 shows the age distribution of both groups. Mean age was 52.39 ± 8.22 years in Group A (Endoscopic ONB) and 55.42 ± 6.8 years in Group B (Percutaneous ONB), with no significant difference ($P = 0.547$).

Table 2 demonstrates that most tumours were ≥3 cm, accounting for 60.0% in Group A (endoscopic ONB) and 56.4% in Group B (percutaneous ONB), while smaller tumours (<3 cm) represented 40.0% and 44.3%, respectively ($P = 0.7934$). The mean number of tumours was slightly higher in Group A (2.06 ± 0.94) compared to Group B (1.65 ± 0.89), but the difference was not statistically significant ($P = 0.0886$).

Table 1: Distribution of the study population based on age ($n = 50$)

Age (years)	Group-A (Endoscopic ONB, $n = 50$)	Group B (Percutaneous ONB, $n = 50$)	*P*-value
Mean ± SD	52.39 ± 8.22	55.42 ± 6.8	0.547

Table 2: Distribution of the study based on clinical features ($n = 50$)

Parameter	Group A (Endoscopic ONB, $n = 50$)	Group B (Percutaneous ONB, $n = 50$)	*P*-value
Tumour size (cm)			0.7934
<3	20 (40.0%)	22 (44.3%)	0.7934
≥3	30 (60.0%)	28 (56.4%)	0.7934
Number of tumours (Mean ± SD)	2.06 ± 0.94	1.65 ± 0.89	0.0886

Table 3 shows that the absence of obturator jerk (86% vs. 78%) and complete tumour resection (84% vs. 78%) were slightly higher in the endoscopic group, though not statistically significant. Bladder perforation occurred only in the percutaneous group (6%). Operative time was shorter (56.42 ± 11.64 vs. 68.10 ± 13.23 min; $P = 0.0006$), and no local complications were noted, versus 30% in the percutaneous group ($P < 0.05$).

Table 4 demonstrates that local site complications were absent in all patients of Group A (0.0%) but occurred in 15 patients (30.0%) of Group B. The difference was statistically significant ($P = 0.0001$).

Discussion

This prospective study precisely evaluated the comparative efficacy of endoscopic versus percutaneous approaches for obturator nerve block (ONB) during TURBT. Initial analysis of patient demographics revealed no statistically significant differences, ensuring that observed clinical outcomes could be confidently attributed to the distinct ONB methodologies. The mean age profile aligns closely with previous research, such as that by Rahman et al.[9] A primary endpoint was the emergence of the obturator jerk. The endoscopic group demonstrated a higher rate of jerk absence (86.00%) compared

Table 3: Distribution of the study based on intraoperative events and postoperative outcomes between two groups ($n = 50$)

Parameter	Group A (Endoscopic ONB, $n = 50$)	Group B (Percutaneous ONB, $n = 50$)	*P*-value
Age (years, Mean ± SD)	52.39 ± 8.22	55.42 ± 6.8	0.547
Obturator jerk	Obturator jerk	Obturator jerk	0.434
Absent	43 (86.0%)	39 (78.0%)	0.434
Present	7 (14.0%)	11 (22.0%)	0.434
Complete tumor resection	Complete tumor resection	Complete tumor resection	0.56
Possible	42 (84.0%)	39 (78.0%)	0.56
Not possible	8 (16.0%)	11 (22.0%)	0.56
Bladder wall perforation	Bladder wall perforation	Bladder wall perforation	0.241
Present	0 (0.0%)	3 (6.0%)	0.241
Absent	50 (100.0%)	47 (94.0%)	0.241
Operative time (min, Mean ± SD)	56.42 ± 11.64	68.10 ± 13.23	0.0006
Local site complication (*n*, %)	0 (0.0%)	15 (30.0%)	<0.05

Table 4: Distribution of the study based on local site complication ($n = 50$)

Local site complication	Group-A (Endoscopic ONB)	Group-B (Percutaneous ONB)	*P*-value
Present	0 (0.0%)	15 (30.0%)	0.0001
Absent	50 (100.0%)	35 (70.0%)	0.0001
Total	50	50	0.0001

to the percutaneous group (78.00%). Although this difference did not achieve statistical significance ($P > 0.05$), the numerical trend favours the endoscopic technique, aligning with findings from Khorrami et al.[10] The effectiveness of ONB is predicated on the pharmacological action of local anaesthetics like lidocaine. These agents reversibly inhibit voltage-gated sodium channels, preventing the propagation of action potentials. Only the unprotonated form of the anaesthetic readily diffuses across the nerve cell membrane to bind and block the channel.[11] Regarding surgical outcomes, complete tumour resection was achieved in 84.00% of endoscopic patients and 78.00% of percutaneous patients. While not statistically significant ($P > 0.05$), this is consistent with the higher complete resection rates reported by Alamgir et al.[8] for the endoscopic approach (96.00% vs. 84.00%).[8] Effective blockade provides the stable operative field necessary for thorough resection. A critical observation was the complete absence of bladder wall perforation in the endoscopic group, compared to three cases (6.00%) in the percutaneous group. The zero-perforation rate holds immense clinical significance, as perforation, often caused by the obturator jerk, is a severe complication.[3,4] In addition, a statistically significant reduction in mean operative time was observed in the endoscopic group ($P < 0.05$), corroborating the findings of Alamgir et al.[8] The direct visualisation afforded by the endoscopic approach likely contributes to this efficiency. Finally, a statistically significant difference in local site complications was identified ($P < 0.05$), with zero incidence in the endoscopic group compared to 30.00% in the percutaneous group. Complications associated with percutaneous regional anaesthesia, as described by Miller, include nerve injury from intraneural injections, which can cause transient or permanent deficits.[12] Other reported issues include hindrance in nerve localisation and hematoma formation, as noted by Cesur et al.[13] The endoscopic approach inherently bypasses these extra-vesical risks. Overall, the consistent numerical advantages for the endoscopic group across jerk control, complete resection, and avoidance of bladder perforation, combined with significantly reduced operative time and the complete elimination of local site complications, strongly advocate for the endoscopic approach as a safer, more efficient, and clinically superior method for obturator nerve block during TURBT.

Limitations of the Study

The study's modest sample size and purposive sampling may limit generalizability and introduce selection bias. Procedural variability arose from surgeries being performed by surgeons with differing experience. In the percutaneous approach, an obturator nerve block was done without real-time guidance; using ultrasound or a nerve stimulator could improve precision and potentially influence the comparative efficacy between techniques.

Conclusion

Endoscopic obturator nerve block (ONB) is a reliable and effective technique for preventing adductor muscle contraction during TURBT, particularly for tumours located on the lateral and posterolateral walls of the bladder. Compared to the percutaneous approach, the endoscopic method allows direct visualisation, enabling precise administration of local anaesthetic and minimising complications such as bladder perforation. It enhances procedural efficiency, reduces operative time, facilitates higher rates of complete tumour resection, and lowers the incidence of local site complications.

Recommendations

The endoscopic approach for obturator nerve block (ONB) is recommended to prevent obturator jerk during transurethral resection of bladder tumours (TURBT), particularly for tumours on the lateral, posterolateral, and inferolateral walls.

By allowing direct visualisation, this technique ensures precise anaesthetic delivery, minimising adductor contraction and intraoperative complications. Larger, multicenter studies are warranted to further validate and optimise this approach.

Ethical Clearance

Ethical Clearance was approved by the Ethical Clearance Committee of Sir Salimullah Medical College, Mitford Hospital.

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