COMPARISON OF ULTRASOUND GUIDED INTERFASCIAL OBTURATOR NERVE BLOCK WITH AND WITHOUT PERIPHERAL NERVE STIMULATION IN TRANSURETHRAL RESECTION OF BLADDER TUMORS UNDER SPINAL ANAESTHESIA.

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ABSTRACT

INTRODUCTION: Transurethral resection of bladder tumor (TURBT) is widely regarded as the primary surgical approach for diagnosing, staging, and initiating treatment of bladder cancer.

AIM: To compare the efficacy and safety of ultrasound-guided interfascial obturator nerve block with and without peripheral nerve stimulation in patients undergoing transurethral resection of bladder tumors under spinal anaesthesia.

METHODOLOGY: This is A hospital-based, randomized, comparative study was conducted from March 2023 to August 2024.

RESULT: The combined ultrasound-guided and peripheral nerve stimulation technique provided significantly better obturator reflex suppression, higher surgeon satisfaction, and eliminated conversion to general anaesthesia compared with ultrasound guidance alone. Although first-attempt success and ease of block were higher with the combined technique, these differences were not statistically significant.

CONCLUSION: The addition of peripheral nerve stimulation to ultrasound-guided obturator nerve block improves block effectiveness, enhances surgeon satisfaction, and reduces the need for conversion to general anaesthesia during TURBT. This combined technique appears to be a safe and more effective approach than ultrasound guidance alone.

KEYWORDS: Obturator nerve block, Ultrasound guidance, Peripheral nerve stimulation

How to cite this article: Agarwal A, Baghel KS, Singhal R, Goyal V, Leuva D, Mathur V, Sachdeva S. Comparison of ultrasound guided interfascial obturator nerve block with and without peripheral nerve stimulation in transurethral resection of bladder tumors under spinal anaesthesia. Int J Drug Deliv Technol. 2026;16(72s): 282-287. DOI: 10.25258/ijddt.16.72s.32

INTRODUCTION

Transurethral resection of bladder tumor (TURBT) is widely regarded as the primary surgical approach for diagnosing, staging, and initiating treatment of bladder cancer.1 This minimally invasive technique is performed endoscopically via the urethra, using electrocautery to precisely excise tumor tissue.[2] A high level of surgical accuracy and well-managed anesthesia are essential for successful outcomes. TURBT plays a key role in the management of bladder tumors by allowing for histological analysis, determining the extent of disease, and, when feasible, removing all visible tumor tissue. Although both regional and general anesthesia are suitable, spinal anesthesia is often favored due to its specific benefits[3].Compared to general anesthesia, spinal anesthesia provides distinct benefits during transurethral resection of bladder tumor (TURBT) procedures. It minimizes intraoperative blood loss by inducing sympathetic blockade and lowering venous pressure, while also promoting more stable hemodynamics—an important factor for elderly patients. The use of neuraxial anesthesia offers more effective pain control around the time of surgery and is linked to fewer postoperative complications, including respiratory problems and cognitive

decline.[4,5] The development of ONB (Obturator Nerve Block) techniques has been characterized by ongoing improvements in both methodology and guidance strategies. Early techniques, like the classic pubic approach outlined by Labat and the interadductor approach described by Parks, were primarily dependent on surface anatomy.[6] These methods were often linked to inconsistent success rates and various complications. The advent of nerve stimulation technology enhanced the accuracy of nerve location, but challenges in consistency and reliability persisted.The introduction of ultrasound guidance has significantly transformed regional anesthesia, including the obturator nerve block (ONB).[7] Ultrasound provides real-time imaging of critical anatomical structures, needle placement, and the distribution of local anesthetics, which can enhance the effectiveness of the block and minimize complications[8]. However,visualizing the obturator nerve using ultrasound poses specific difficulties because of its small size and its deep position within the interfascial plane between the muscles.The combination of ultrasound guidance with nerve stimulation is based on the idea that each method offers unique advantages that can enhance overall effectiveness.[9] Ultrasound enables visualization of anatomical structures and tracking of anesthetic dispersion, whereas nerve stimulation provides functional verification of needle placement by eliciting a motor response. On the other hand, proponents of the interfascial approach contend that precise deposition of anesthetic within the appropriate tissue layer is adequate for consistent nerve blockade, thus negating the need for nerve stimulation.

AIM

To compare the efficacy and safety of ultrasound-guided interfascial obturator nerve block with and without peripheral nerve stimulation in patients undergoing transurethral resection of bladder tumors under spinal anesthesia.

METHODOLOGY

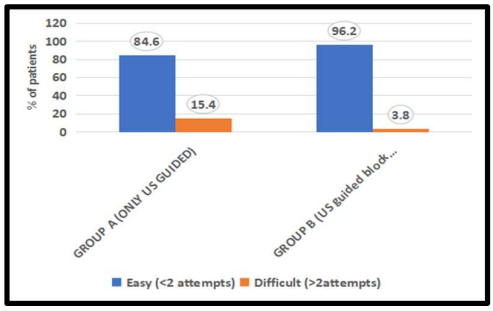
This is A hospital-based, randomized, comparative study was conducted from March 2023 to August 2024.52 patients were divided into two groups (n=26 each), calculated based on 0.80 effect size between groups, with 5% significance level and 80% power.Computer-generated random numbers were used for group allocation.patients were divided into two groups -Group A: Ultrasound guided Obturator nerve Block will be administered to the patients using Peripheral nerve stimulator using bupivacaine 0.5% 20ml. Group B: Ultrasound guided Obturator nerve Block will be administered to the patients using bupivacaine 0.5% 20ml without peripheral nerve stimulator.

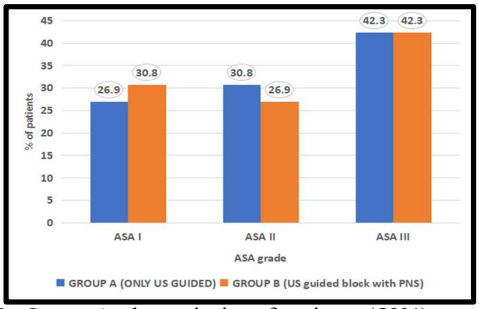
Patients included Age 18-65 years of all genders ,ASA I-III and Patients scheduled for TURBT surgery under Spinal Anaesthesia. While patients with Uncontrolled comorbidities, peripheral neuropathy ,Neuropsychiatric disorders, Lower extremity motor/sensory deficits and Coagulopathy/anticoagulation were excluded.

RESULT

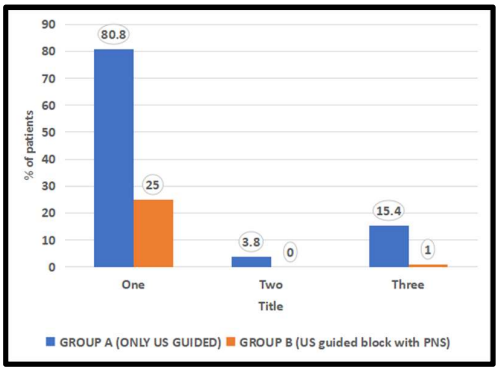
Table 1 : Age group and gender wise distribution of patients (N=52)

Age groups	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)	
	No.	%	No.	%
41-60	10	38.5	15	57.7
61-80	13	50	09	34.6
81-100	03	11.5	02	7.7
Fisher exact value=1.96, p value=0.44				
Male	21	80.8	25	96.2
Female	05	19.2	01	3.8
Yates' corrected χ^2 =1.96,df=1, Yates' corrected p value=0.19				





In Group A, the majority of patients (50%) were in the 61-80 age range, while Group B had more patients (57.7%) in the 41-60 age range. The eldest age group (81-100) comprised the smallest proportion in both groups at 11.5% and 7.7% respectively.Group A (US-guided block with PNS) included 80.8% males (n=21) and 19.2% females (n=5), while Group B (only US-guided) had an even



stronger male predominance with 96.2% males (n=25) and only 3.8% females (n=1).

Figure 1,2: ASA grade and Co-morbidities wise distribution of patients (N=52)

In Group A (US-guided only), 26.9% (n=7) were classified as ASA grade 1, 30.8% (n=8) as grade 2, and 42.3% (n=11) as grade 3. Similarly, in Group B (US-guided with PNS), 30.8% (n=8) were ASA grade 1, 26.9% (n=7) were grade 2, and 42.3% (n=11) were grade 3.The high p-value (0.93) indicates remarkable similarity in ASA grade distribution.

Hypertension was present in 19.23% (n=5) of patients in both groups. Diabetes was slightly more prevalent in Group B (23.08%, n=6) compared to Group A (15.38%, n=4). The most common comorbidity combination in both groups was hypertension with diabetes, present in 26.92% (n=7) of Group A and 34.62% (n=9) of Group B patients.Notable differences were observed in patients with more complex comorbidity profiles. Group A had more patients with diabetes and CAD (7.69% vs 0%), hypertension and CAD (11.54% vs 3.85%), and the triple combination of hypertension, diabetes, and CAD (15.38% vs 7.69%). Group B had more patients without any comorbidities (11.54% vs 3.85%).

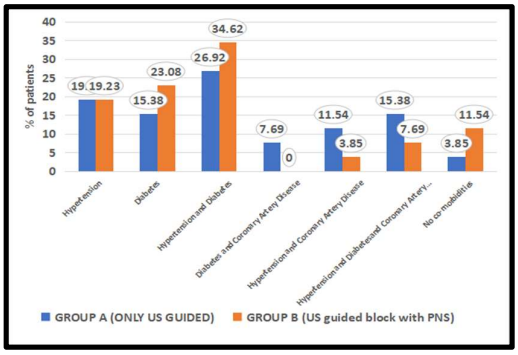
Table 2 : Comparison of vitals between both the groups (N=52)

Vitals	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)		Test Statistics Mann Whitney U Test	
	Median	IQR	Median	IQR	Z value	p value
Heart Rate	79.00	13	76.00	15	-0.128	0.898
Systolic Blood Pressure	147.50	19	149.00	21	-0.623	0.533
Diastolic Blood Pressure	76.00	26	88.00	15	-1.456	0.145
Respiratory Rate	13.00	2	13.00	1	-1.050	0.294

The median heart rate was slightly higher in Group A (79.00 beats/min, IQR=13) compared to Group B (76.00 beats/min, IQR=15).Systolic blood pressure showed similar values between groups, with medians of 147.50 mmHg (IQR=19) in Group A and 149.00 mmHg (IQR=21) in Group B (Z=-0.623, p=0.533). Diastolic blood pressure appeared higher in Group B (median=88.00 mmHg, IQR=15) compared to Group A (median=76.00 mmHg, IQR=26), but this difference did not reach statistical significance (Z=-1.456, p=0.145).

Respiratory rate was identical in both groups with a median of 13.00 breaths/min, with only a slight difference in interquartile range (IQR=2 in Group A, IQR=1 in Group B; Z=-1.050, p=0.294).The Mann-Whitney U test results indicate no statistically significant differences in any vital sign parameters between the two groups (all p-values >0.05). **Figure 3,4: Comparison of number of attempts and ease of approach between both the groups (N=52)**

In Group A, 80.8% (21/26) of patients required only one attempt, 3.8% (1/26) required two attempts, and 15.4% (4/26) needed three attempts. In contrast, Group B showed improved first-attempt success with 96.2% (25/26) requiring only one attempt and just 3.8% (1/26) needing three attempts, with no patients requiring two attempts. Group A (US-guided only), 84.6% (n=22) of blocks were classified as "easy" (requiring fewer than 2 attempts), while 15.4% (n=4) were classified as "difficult" (requiring more than 2 attempts). In



Group B (US-guided with PNS), a larger proportion of blocks (96.2%, n=25) were classified as "easy," with only one case (3.8%) classified as "difficult."

Table3: Comparison of obturator reflex grade between both the groups (N=52)

Obturator Reflex Grade	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)	
	No.	%	No.	%
No Movement (Grade 1)	16	61.5	24	92.3
Palpable Twitch (Grade 2)	04	15.4	02	7.7
Slight Movement (Grade 3)	06	21.3	00	00
Vigorous Movement (Grade 4)	00	00	00	00
Fisher exact value=8.3, p value=0.017				

In Group B (US-guided with PNS), 92.3% (n=24) of patients achieved Grade 1 (no movement), compared to only 61.5% (n=16) in Group A (US-guided only). Group A had higher proportions of Grade 2 (palpable twitch) at 15.4% (n=4) versus 7.7% (n=2) in Group B, and notably, 21.3% (n=6) of Group A patients experienced Grade 3 (slight movement), while no patients in Group B had this level of reflex.Neither group had any cases of Grade 4 (vigorous movement), which would have interfered with the surgical procedure and necessitated conversion to general anesthesia.

Table 4: Comparison of complications between both the groups (N=52)

Complications	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)	
	No.	%	No.	%
No complications	26	100	26	100

Group A (US-guided only) nor Group B (US-guided with PNS) experienced any complications during the procedure, with 100% of patients in both groups (n=26 each) having no reported complications.

Table 5: Comparison of conversion to GA between both the groups (N=52)

Conversion to GA	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)	
	No.	%	No.	%
No	20	76.9	26	100
Yes	06	23.1	00	00
Yates' corrected χ^2 =4.71,df=1, Yates' corrected p value=0.03				

In Group A (US-guided only), 23.1% (n=6) of patients required conversion to general anesthesia, while in Group B (US-guided with PNS), no patients (0%) required conversion.

Table 6: Comparison of surgeon satisfaction between both the groups (N=52)

Surgeon Satisfaction	Group A only US guided(n=26)		Group B US guided block with PNS(n=26)	
	No.	%	No.	%
Dissatisfied	06	23.1	00	00
Neutral	04	15.4	02	7.7
Satisfied	16	61.5	24	92.3
Fisher exact value=8.3, p value=0.017				

In Group B (US-guided with PNS), surgeons reported significantly higher satisfaction rates with 92.3% (n=24) being "satisfied," compared to only 61.5% (n=16) in Group A (US-guided only). Notably, Group A had 23.1% (n=6) "dissatisfied" ratings, while Group B had none. "Neutral" ratings were also lower in Group B (7.7%, n=2) compared to Group A (15.4%, n=4).

DISCUSSION

The age distribution across both groups showed no statistically significant differences (p=0.44), with the majority of patients falling within the 41-80 years age range. This demographic pattern aligns with the typical age distribution of bladder cancer patients, as noted by Babjuk et al., who reported a median age of 73 years at diagnosis with most cases occurring between the sixth and eighth decades of life.[10] Gender distribution showed a predominance of male patients (80.8% in Group A, 96.2% in Group B) without statistically significant differences between groups (p=0.19).

Our findings revealed that while Group B (US-guided with PNS) demonstrated higher first-attempt success rates (96.2% vs. 80.8%), this difference did not reach statistical significance (p=0.6). Similarly, the ease of approach was comparable between groups, with 84.6% of blocks in Group A and 96.2% in Group B classified as "easy" (p=0.34). As noted by Akkaya et al., ultrasound provides real-time visualization of relevant anatomical structures, significantly enhancing the precision of regional blocks.[11]

Our study demonstrated significantly better obturator reflex suppression in Group B, with 92.3% of patients achieving Grade 1 (no movement) compared to only 61.5% in Group A (p=0.017). This finding has substantial clinical implications, as effective suppression of the obturator reflex is crucial for preventing bladder perforation and ensuring complete tumor resection.

The superior efficacy of the combined approach aligns with findings from Thallaj et al., who reported complete suppression of the obturator reflex in 95% of cases using combined ultrasound and nerve stimulation compared to 75-85% with ultrasound alone.[12]

Perhaps the most clinically significant finding of our study was the complete elimination of conversion to general anesthesia in Group B (0% vs. 23.1% in Group A, p=0.03). This represents a substantial advantage for patient safety and procedural efficiency. This finding is supported by Pladzyk et al., who reported a significant reduction in conversion rates with more effective obturator blockade techniques.[13]

Our data showed significantly higher surgeon satisfaction in Group B, with 92.3% reporting satisfaction compared to only 61.5% in Group A (p=0.017). Notably, 23.1% of cases in Group A resulted in surgeon dissatisfaction, while no cases in Group B were rated as dissatisfactory.Tekgul et al. demonstrated that more effective obturator blockade was associated with lower tumor recurrence rates at two-year follow-up, suggesting that technical advantages may translate into meaningful clinical benefits.[14]

The findings of our study have several important clinical implications. First, they suggest that while ultrasound guidance alone provides acceptable results for obturator nerve block, the addition of peripheral nerve stimulation offers significant advantages in terms of block quality, procedural success, and surgeon satisfaction.

Second, our data highlight the importance of complete obturator nerve blockade in preventing conversion to general anesthesia.

Third, the improved surgeon satisfaction with the combined technique suggests potential benefits for procedural quality and oncological outcomes. While our study did not directly assess long-term outcomes, the established relationship between surgical field quality and resection completeness suggests potential downstream benefits.

CONCLUSION

Based on our findings, we conclude that the addition of peripheral nerve stimulation to ultrasound-guided interfascial obturator nerve block significantly enhances the quality and efficacy of neural blockade during transurethral resection of bladder tumors under spinal anesthesia.The combined approach provided more effective suppression of the obturator reflex, with 92.3% of patients achieving complete reflex inhibition compared to only 61.5% with ultrasound alone (p=0.017). This translated to a complete elimination of conversion to general anesthesia in the combined technique group, representing a significant clinical advantage (p=0.03). Furthermore, surgeon satisfaction was markedly higher with the combined approach, with 92.3% satisfaction versus 61.5% in the ultrasound-only group (p=0.017).While both techniques demonstrated excellent safety profiles with no complications in either group, the combined technique's superior efficacy did not come at the expense of increased procedural complexity, as evidenced by the comparable ease of approach between groups. The high first-attempt success rate with the combined technique (96.2%) further supports its clinical utility. We recommend the routine incorporation of peripheral nerve stimulation alongside ultrasound guidance for obturator nerve blocks to improve block quality, enhance surgical conditions, and eliminate the need for conversion to general anesthesia. This approach may be especially beneficial for elderly patients with multiple comorbidities who comprise the majority of the bladder cancer population and for whom avoiding general anesthesia offers particular advantages.

REFERENCE

1.Gray’s Anatomy [Internet]. 2020 [cited 2025 Apr 25]. Available from: https://shop.elsevier.com/books/grays-anatomy/standring/978-0-7020-7705-0

2.Akkaya T, Ozturk E, Comert A, Ates Y, Gumus H, Ozturk H, et al. Ultrasound-guided obturator nerve block: a sonoanatomic study of a new methodologic approach. AnesthAnalg. 2009 Mar;108(3):1037–41.

3.Anagnostopoulou S, Kostopanagiotou G, Paraskeuopoulos T, Chantzi C, Lolis E, Saranteas T. Anatomic variations of the obturator nerve in the inguinal region: implications in conventional and ultrasound regional anesthesia techniques. Reg Anesth Pain Med. 2009;34(1):33–9.

4.Kumka M. Critical sites of entrapment of the posterior division of the obturator nerve: anatomical considerations. J Can Chiropr Assoc. 2010 Mar;54(1):33–42.

5.Kendir S, Akkaya T, Comert A, Sayin M, Tatlisumak E, Elhan A, et al. The location of the obturator nerve: a three-dimensional description of the obturator canal. Surg Radiol Anat SRA. 2008 Aug;30(6):495–501.

6.Tipton JS. Obturator neuropathy. Curr Rev Musculoskelet Med. 2008 Dec;1(3–4):234–7.

7.Obturator Nerve - an overview | ScienceDirect Topics [Internet]. [cited 2025 Apr 26]. Available from:https://www.sciencedirect.com/topics/medicine-and-dentistry/obturator-nerve

8.Tipton JS. Obturator neuropathy. Curr Rev Musculoskelet Med. 2008 Jun 11;1(3–4):234–7.

9.Turgut M, Protas M, Gardner B, Oskouian R, Loukas M, Tubbs R. The accessory obturator nerve: an anatomical study with literature analysis. Anatomy. 2017 Dec 1;11:121–7.

10.Babjuk M, Burger M, Compérat EM, Gontero P, Mostafid AH, Palou J, et al. European Association of Urology Guidelines on Non-muscle-invasive Bladder Cancer (TaT1 and Carcinoma In Situ) - 2019 Update. Eur Urol. 2019 Nov;76(5):639–57.

11.Akkaya T, Ozturk E, Comert A, Ates Y, Gumus H, Ozturk H, et al. Ultrasound-guided obturator nerve block: a sonoanatomic study of a new methodologic approach. AnesthAnalg. 2009 Mar;108(3):1037–41.

12.Thallaj A, Rabah D. Efficacy of ultrasound-guided obturator nerve block in transurethral surgery. Saudi J Anaesth. 2011;5(1):42–4.

13Pladzyk K, Jureczko L, Lazowski T. Over 500 obturator nerve blocks in the lithotomy position during transurethral resection of bladder tumor. Cent Eur J Urol. 2012;65(2):67–70.

14.Tekgül ZT, Divrik RT, Turan M, Konyalioglu E, Simsek E, Gönüllü
M. Impact of Obturator Nerve Block on the Short-Term Recurrence of Superficial Bladder Tumors on the Lateral Wall. Urol J. 2014 Mar 3;11(1):1248–52.