

# A Prospective Randomised Controlled Trial, Comparison of Two Techniques of Obturator Nerve Block during Transurethral Resection of Bladder Tumour (TURBT)

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## ABSTRACT

**Background and aims:** Obturator nerve traverses close to the posterolateral surface of urinary bladder during its course in the pelvis. During Transurethral Resection of Bladder Tumour (TURBT), its stimulation leads to obturator jerk due to contraction of the muscles of the medial compartment of the thigh. Obturator jerk is a risk factor for bladder wall perforation and may even lead to injury to surrounding pelvic vessels. Obturator nerve block prevents the stimulation of nerve during TURBT. We designed this study to compare two techniques of obturator nerve blocks i.e., landmark guided inguinal technique and transvesical technique to determine the efficacy of obturator nerve block during transurethral resection of bladder tumour.

**Method:** This randomised, single-blind controlled trial was conducted after ethical approval in patients with lateral or posterolateral urinary bladder mass, with American society of anesthesiologists physical status II and III after obtaining consent. Group T received transvesical and the group I received inguinal obturator nerve block with 15 ml of 0.5% bupivacaine. Each group enrolled 50 participants, 40 males and 10 females.

**Results:** In group T, the adductor jerk occurred in 6 out of 50 cases (12%), whereas in the group I, obturator jerk occurred in 14 out of 50 cases (28%). The difference was statistically significant (P-value 0.046). There were no complications in both groups. One patient in group T required conversion to general anaesthesia.

**Conclusion:** Our study concludes that during transurethral resection of bladder tumours, the obturator nerve block by transvesical approach is more effective than by the inguinal approach.

**Keywords:** Transurethral resection of bladder; Urinary bladder neoplasms; Pelvis

## INTRODUCTION

The bladder is a common site for cancer development in the urinary tract, with an overall incidence of 2.25% in India. Transurethral Resection of Bladder Tumour (TURBT) is a diagnostic and therapeutic tool for the management of bladder tumours and is commonly performed under spinal anaesthesia. The spinal anaesthesia leads to s haemodynamics, decreased blood loss, early recognition of bladder perforation and fewer chances of deep vein thrombosis, reduced postoperative delirium and faster recovery [1]. However, obturator jerk is a common problem encountered during TURBT under spinal anaesthesia, which may lead to complications like bladder perforation, blood

loss, hemodynamic instability, dyselectrolytemi, pelvic vascular injury and rarely death.

The obturator nerve originates from the L2-4 nerve roots. The nerve traverses downwards on psoas muscle along with obturator vessels before entering into the pelvic cavity and then it runs close to the inferolateral wall of the bladder before entering the obturator canal. After exiting the obturator canal, it branches into anterior and posterior divisions and innervates adductor and obturator externus muscles. It is a mixed nerve containing both motor and sensory nerve fibers. This nerve can be easily blocked at the level of inguinal crease where it divides into anterior and posterior branches.

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**Received:** 02-Jul-2024, Manuscript No. jacr-24-32588; **Editor assigned:** 5-Jul-2024, PreQC No. jacr-24-32588 (PQ); **Reviewed:** 19-Jul-2024, QC No. jacr-24-32588; **Revised:** 09-Jan-2025, Manuscript No. jacr-24-32588 (R); **Published:** 16-Jan-2025, DOI: 10.35248/2155-6148.25.16.1171

**Citation:** Gupta R (2025) A Prospective Randomised Controlled Trial, Comparison of Two Techniques of Obturator Nerve Block during Transurethral Resection of Bladder Tumour (TURBT). J Anesth Clin Res. 16:1171.

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Due to distention of the urinary bladder during TURBT, the obturator nerve comes very close to the lateral bladder wall and electrical currents can easily stimulate the obturator nerve. Various measures have been employed to minimize and prevent adductor jerk ranging from blocking of obturator nerve, changing the site of inactive electrode, decreasing the voltage of cutting and coagulating currents and conversion to general anaesthesia with muscle relaxants. However, obturator nerve blockade has been found to be the most effective intervention in preventing this complication.

There are many techniques of obturator nerve block described in literature but none of them proved to be 100% effective. In this study we want to analyse and compare effectiveness of landmark guided and transvesical techniques for obturator nerve block. We also want to see that; in this era of technology can we rely on landmark guided or transvesical approach for obturator nerve block [2].

## MATERIALS AND METHODS

Institutional ethics committee IGMCM Shimla, registration no-ECR/533/INST/HP/2014/RR-17, protocol no-62/2019, approved on 29.08. 2019. Clinical Trials Registry-India (ICMR-NIMS), CTRI Reg. Date-05/12/2019, CTRI Reg. No-CTRI/2019/12/022268, ctri.nic.in/Clinical trials.

This prospective randomized, single-blind controlled trial for comparing two obturator nerve block techniques in participants scheduled for TURBT was conducted from December 2019 to November 2020 at tertiary health institute. Ethical approval was taken from institutional committee before enrollment of the participants. Clinical trial registration was done in clinical trial registry-India. Written informed consent was obtained from each participant before enrollment and use of the patient data for research and educational purposes. The study was carried out in accordance with the principles of the declaration of Helsinki, 2013. Each group was assigned 50 participants, 40 males and ten females. Inclusion criteria are, ASA I, II and III patients, radio logically or cystoscopically diagnosed cases of superficial urinary bladder mass present on posterolateral wall and patient of any age fit for TURBT and spinal anesthesia. Exclusion criteria's are, patient's refusal to participate and not giving consent for study, patients having hypersensitivity to local anesthetic, patients on anticoagulant and antiplatelet drugs, severe cardiac disease graded as NYHA class III-IV, previous obturator nerve injury and local infection at block site [3].

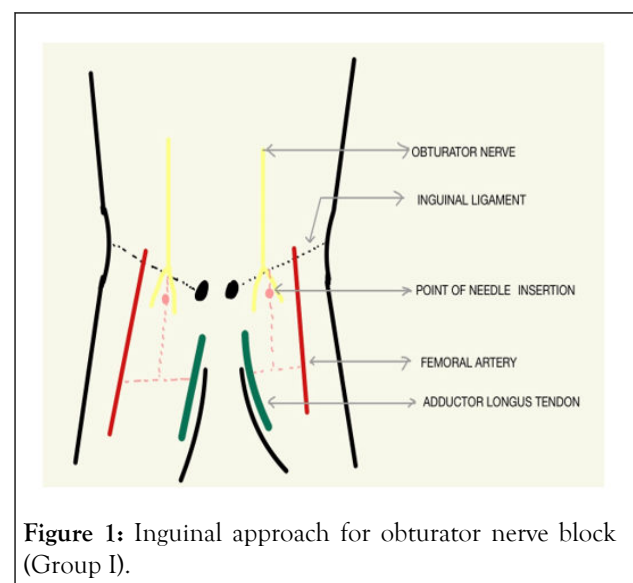
Stratified block randomization was done by generating cards by using random allocation software for male and female patients separately. These cards were generated and placed in sealed, opaque envelopes by a third party. One card was reserved for one patient only strictly in serial order. These cards remained in the custody of the theatre staff with no access to investigators. Before the induction of surgery, one card was opened by the theatre staff and the name of technique was disclosed to anesthetist and operating surgeon simultaneously and loudly. After spinal anaesthesia, either technique was used to block the obturator nerve on the tumour-bearing side. Obturator nerve

was blocked transvesically (group T) by operating surgeon, whereas by inguinal technique (group I), it was blocked by anesthetist.

Objective of the study was to compare the success of obturator nerve block with the help of inguinal and transvesical technique. Primary outcome of the study was incidence of adductor jerk. Presence or absence of adductor jerk was measured by visible movement of leg of patient. Secondary outcome was presence or absence of any complication because of adductor jerk and whether surgeon is able to proceed with surgery without general anesthesia.

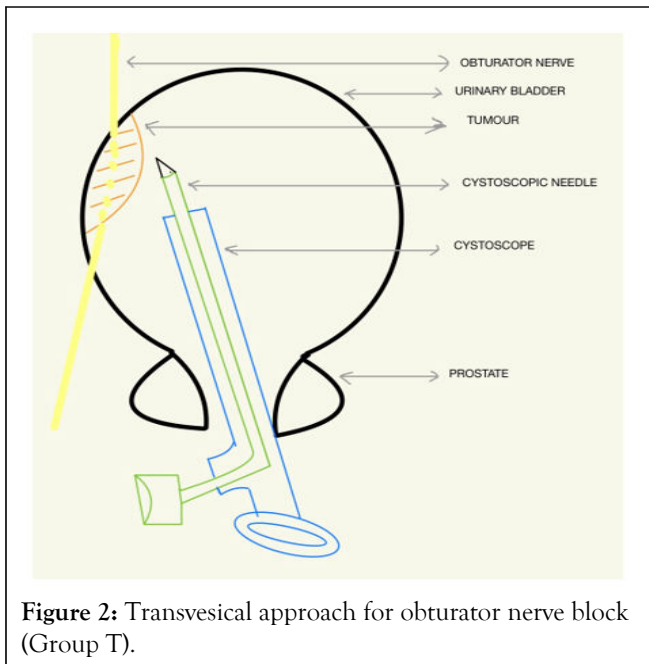
After shifting the patient to the operation theatre, intravenous access was secured, IV fluids started and monitors attached. With the patient in sitting position, the part was cleaned and draped and L3-L4 inter space was identified by palpation. The subarachnoid block was established by administering 3 ml of 0.5% bupivacaine hyperbaric solution and the patient was turned to the supine position. After 10 min, once the sensory level reached T10, the obturator nerve was blocked by either technique on the tumour-bearing side.

In the inguinal technique (group I), the inguinal crease was marked in the supine position with the leg in slight abduction. The adductor longus tendon was identified at the medial border of the thigh and the maximum pulsation of the femoral artery was marked. The centre point between the inner wall of the adductor longus tendon and the femoral artery was marked. A line was drawn at 90° from the centre towards the inguinal crease. The blunt tipped 22 spinal needle was used. It was inserted 0.5 cm below the point where the midline met the inguinal crease (Figure 1). The needle was introduced at 30° angles to the skin in cephalad direction till adductor muscle was pierced. 7.5 ml of 0.5% bupivacaine was injected at that point. The needle was then advanced about 0.5 cm-1 cm and 5° laterally and additional 7.5 ml of 0.5% bupivacaine was administered at that point [4].



**Figure 1:** Inguinal approach for obturator nerve block (Group I).

In group T, the patient was placed in a lithotomy position with lateral tilt on the tumour bearing side. The operating surgeon introduced a cystoscope into the bladder per urethral route. After distending the bladder with normal saline, he injected 15 ml of 0.5% bupivacaine with a cystoscopic injection needle in the peritumoural area on the posterolateral wall, roughly between the ipsilateral ureteral orifice and the bladder neck (Figure 2).



The adductor jerk was evaluated by visible contraction of adductor muscles of the thigh, palpation of contraction of adductor muscles, jerky movements or sustained contraction of the leg during the procedure due to contraction of adductor muscles. Score was assigned after observation for 20 min.

- 0=Adductor spasm,
- 1=Reduced adductor spasm (50% reduction),
- 2=No adductor spasm.

A score of 2 was considered as a successful block.

Skin puncture with 22-gauge spinal needle was taken as the first attempt. Redirection of the needle without skin puncture was not considered as an additional attempt. Only new skin puncture was viewed as another attempt. Number of needle passes less than two was considered as an easy approach and needle passes more than two was considered as a difficult approach. Procedure time was also recorded with the help of wall clock of operation theater [5].

As per literature, the efficacy of obturator nerve block technique by inguinal approach (blind) ranged from 77.1% to 85% whereas the efficacy of obturator nerve block by trans vesical approach ranged from 90% to 97.3%. Taking the difference of 22.2% between two approaches based on article PMID: 28298765, sample size was calculated based on 80% power and 95% significance for adductor jerk using the open epi software. The calculated sample size of 100 included 50 cases each by either approach i.e., inguinal or transvesical.

We analysed the data with statistical tool SPSS version 21. We applied Pearson *Chi-square* test for primary outcome compression between two groups. For secondary outcome there is no need for any analyses.

We considered obturator nerve block successful when the surgeon is able to proceed with surgery without any complication because of adductor jerk and requiring general anaesthesia.

## RESULTS

In group T, the adductor jerk occurred in six out of 50 cases. While in group I, we saw adductor jerk in 14 out of 50 cases. The Pearson *Chi-square* test revealed p-value 0.046, which was statistically significant. In group I, there was no complication with nil conversion to general anaesthesia and. In group T, there were no complications, but one patient required conversion to general anaesthesia for completion of surgery.

In both groups, the mean number of attempts for the obturator nerve block was one, hence similar. In group T, the average procedure time was 2.34 min, while in group I, the average procedure time was 1.66 min. The difference was found to be statistically insignificant [6].

## DISCUSSION

Cancer of the bladder is the seventh most frequently diagnosed malignancy around the world. In 1910 Beer described the technique of Transurethral Resection of Bladder Tumour (TURBT), which remains the basis of diagnosis and initial treatment for bladder tumours. These patients are elderly i.e., mainly 60-70 yr. having cardiac, pulmonary, renal and other co morbidities. Systemic fluid absorption during TURBT may lead to transurethral resection syndrome manifest as hyponatremia and altered sensorium.

Obturator nerve stimulation can happen either due to the transmission of current or local factors like increased temperature because of local tissue hitting during electroresection. Venkatramani V, et al. compared monopolar versus bipolar transurethral resection of bladder tumours and also stated that local factors leads to stimulation of nerve. The incidence of adductor jerks in the literature range from 10% to 35% during TURBT. This local stimulation of the obturator nerve is a drawback of spinal anaesthesia. That is why we preferred spinal anaesthesia with obturator nerve block.

As with time there are many techniques developed for obturator nerve block but none of them proved to be 100% effective and without complications. In this study, both the techniques, had proven high success rate and very little minor complication. Both the techniques were easy to conduct and had short learning curve. Due to these reasons we preferred to work on these two techniques [7].

We enrolled 103 patients, 82 males and 21 females. Two patients (one male and one female) having bladder mass on preoperative ultrasonography and randomised to group T, did not reveal any mass on cystoscopy. One patient (male) randomised to the group I, had the mass on the opposite side

compared to preoperative ultrasonography. These three patients were excluded from the analyses. Both groups included 50 patients each (40 males and 10 females).

In our study, we injected 15 ml of 0.5% of bupivacaine to block the obturator nerve. D Sharma, et al. uses total volume of 15 ml (10 ml of two per-cent of lingo ADR with 5 ml of 0.5 percent of bupivacaine). 7.5 ml of drug was used to block the anterior division and rest 7.5 ml for the posterior division. Mean age in group T was 63.76 yr. in comparison to 65.36 yr in group I. The difference was statistically insignificant. Mean weight in group T was 62.20 kg in comparison to 60.64 kg in group I. The difference was statistically insignificant [8].

The transvesical approach of obturator nerve stimulation was better because we infiltrated the local anesthetic solution around the bladder mass under direct visual guidance same stented by D Sharma et al. The bladder was partially distended during the cystoscopy by infusion of normal saline, thereby bringing the obturator nerve closer to the posterolateral wall of the urinary bladder. In our study, 15 ml of 0.5% of bupivacaine was injected around the tumour. This volume was quite effective in preventing the stimulation of the obturator nerve.

In group I, there was no complication with nil conversion to general anaesthesia and. In group T, there were no complications, but one patient required conversion to general anaesthesia for completion of surgery. Moningi S, et al. also stated that there was no complications seen during TURBT in inguinal obturator nerve block. The analysis of the data revealed the transvesical technique of obturator nerve block to be more effective than the inguinal technique in our study.

In both groups, the mean number of attempts for the obturator nerve block was one, hence similar. In group T, the average procedure time was 2.34 min, while in group I, the average procedure time was 1.66 min. The difference was found to be statistically insignificant.

As bladder tumour cases also present as emergency so it is important to determine the procedure time for obturator nerve block.

Our primary outcome was adductor jerk and with the help of both the techniques of obturator nerve block we successfully achieved significant reduction in adductor jerk. We also fulfill our secondary goal. This data supports our hypothesis that in this era of technology without USG and nerve stimulator guidance we can achieve successful obturator nerve block by landmark and transvesical techniques [9].

Limitation of study was limited time period and less number of patients. Although number of cases of bladder neoplasm is high but for this study we required specific cases with neoplasm on lateral wall of urinary bladder and these are only 20% of total cases.

As India is a developing country, that's why in many clinical setups still USG and nerve stimulator is not available or accessible. With the help of landmark guided and transvesical techniques we can provide safe operative environment to patients.

But still there is lots of area for further study in this field. Landmark guided and transvesical techniques to be compared with USG and nerve stimulator guided techniques [10].

## CONCLUSION

Obturator nerve block is effective for preventing complications occurs because of stimulation of obturator nerve during TURBT. It is wise to use USG and nerve stimulation for nerve location during peripheral nerve blocks but landmark guided blocks still hold their place in case of emergency and in setups without USG and nerve stimulator. With this work we want to highlight the effectiveness of landmark guided obturator nerve block.

We conclude that the obturator nerve block by transvesical technique is more effective than the obturator nerve block by inguinal technique. Blind techniques for obturator nerve block are safe, less time consuming and plays a very crucial role in emergency surgeries.

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