

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

COMPARISON OF OBTURATOR NERVE BLOCK BY CONVENTIONAL APPROACH IN SUPINE POSITION VERSUS INTER-ADDUCTOR APPROACH IN LITHOTOMY POSITION TO PREVENT ADDUCTOR MUSCLE CONTRACTIONS DURING TRANS URETHRAL RESECTION OF BLADDER TUMOURS



Anaesthesiology

Dr. Pratima Singh* M. B. B. S., D. A., Secondary DNB Resident, BLK-MAX Superspeciality Hospital, New Delhi. *Corresponding Author

ABSTRACT

Background: Bladder growth is the most prevalent urological malignancy. It is managed by Trans-urethral resection of bladder tumour (TURBT). TURBT is often performed under spinal anaesthesia (SA), but it cannot block the obturator jerk reflex. Use of general anaesthesia or Obturator Nerve Block (ONB) followed by spinal anaesthesia (SA) prevents obturator jerk. [2,4] **Objective:** To assess and compare the efficacy and safety of obturator nerve block performed in supine position by conventional approach versus inter-adductor approach in lithotomy position using Ultrasound and peripheral nerve stimulator after spinal anaesthesia. **Materials And Methods:** Prospective, randomised, controlled, interventional, double blind study was done. Total 100 patients of ASA physical status I, II and III, between 45 and 75 years undergoing TURBT under SA with ONB were randomly allocated to two equal groups. Group I: ONB by conventional approach in supine position. Group II: ONB by inter-adductor approach in lithotomy position. After giving SA, ONB was given under ultrasound guidance with the use of peripheral nerve stimulator to aid the accuracy and precision of block. Patients were studied for adductor spasm, ease of administration, number of needle passes and the time required to give the block and complications, if any. **Result:** Statistically significant occurrence of adductor spasm was noted in Group I compared to Group II ($p < 0.05$). **Conclusion:** ONB given by inter-adductor approach in lithotomy position was easy to perform and had higher success rate as compared to ONB given by conventional approach in supine position.

KEYWORDS

TURBT, ONB, SA, USG, PNS.

INTRODUCTION:

Bladder growth is the most prevalent urological malignancy.^[1] The basic methods for diagnosis and management are cystoscopy and transurethral resection of bladder tumor (TURBT). 70-80% of cases are non-muscle invasive (NMIBC) at time of diagnosis. TURBT is the most common surgical technique for the diagnosis and initial treatment of bladder cancer.^[2,4] The aim of TURBT is removing all visible lesions in the bladder, including part of the underlying muscle tissue.

Obturator nerve originates from L2-L4 lumbar plexus and passes through obturator foramen.^[1,4] It supplies adductor muscles of thigh and passes close to infero-lateral bladder wall, bladder neck and prostatic urethra. As it courses through the pelvis, during transurethral operations, resection in these areas with electrocautery invariably stimulates the obturator nerve resulting in mass contraction of the adductor muscles. The violent jerking of the legs disturbs the surgeon causing inadequate resection and may also lead to an inadvertent bladder perforation and even vascular injury.^[2,5]

To overcome this problem, various techniques have been evaluated. Peripheral nerve blocks remain a well-accepted component of comprehensive anesthetic care. Transurethral resection of a bladder tumor (TURBT) is often performed under spinal anaesthesia, but it cannot block the obturator jerk reflex. The obturator reflex occurs when the obturator nerve is directly stimulated by the electrical current transmitted by the electro cautery resectoscope, especially when the tumor is localized at the lateral wall of the bladder, where the obturator nerve runs in close proximity during its intrapelvic course.^[1,4]

The techniques that prove to be effective for preventing the obturator jerk are:

- General anaesthesia
- Obturator nerve block (ONB) following spinal anaesthesia.^[3,5]

Review Of Literature:

Selective obturator nerve block was first described by Labat in 1922. Labat's classical technique was modified by Parks in 1967. In 1993, the inter-adductor approach was described by Wassef, which was further modified by Pinnock in 1996. In 2002, Misbah et. al, conducted a study to compare inter-adductor approach to obturator nerve block for transurethral resection procedure of bladder tumours with traditional approach. They compared the two approaches in terms of the insertion-adductor contraction interval (ICI), success rate, completion of block time and plasma lignocaine concentration. An obturator nerve block by the inter-adductor approach was performed by needle insertion 1 cm behind the adductor longus tendon and 2 cm lateral to the pubic arch in 12 patients, and by the traditional approach in 12 patients. The ICI with the inter-adductor approach was significantly shorter than that with the traditional approach. The

success rate, completion of the block, and plasma lidocaine concentrations were similar with both approaches. They concluded that the inter-adductor approach can provide faster identification of the obturator nerve than the traditional approach. In 2004, M. Cucurella et. al, prospectively studied the obturator nerve blockade in TURBT under spinal anaesthesia, by the inter-adductor approach with the patients in lithotomy position. Blockade of an obturator nerve was performed in 80 patients using inter-adductor approach with 10 mL of 2% Lidocaine. 74 (92.06%) blockades were recognized as successful, 9 (4.76%), as satisfactory and in 6 (3.18%) cases there was no blockade. They did not observe any complications related to the blockade. In one case with satisfactorily recognized blockade, perforation of the bladder wall occurred. It was treated conservatively. They concluded that inter-adductor approach for obturator nerve block in lithotomy position is effective and safe.

In 2004, Seba et al. studied 50 patients undergoing TURBT in two groups of which one received only spinal anaesthesia and the other group received spinal anaesthesia with obturator nerve block using 1% 10 cc lignocaine unilaterally or bilaterally depending upon position of bladder tumor, they observed that adductor jerks were significantly reduced in group that received obturator nerve block with spinal anaesthesia. One patient who received sole spinal anaesthesia had to undergo exploratory laprotomy due to inadvertent bladder perforation caused by adductor jerks. They found use of obturator nerve block in conjunction with spinal anaesthesia for TURBT safe and efficacious.

In 2012, Williams et.al, conducted a study to compare blind and nerve stimulation guided trans urethral obturator nerve block (ONB) in transurethral resection of bladder tumor (TURBT) to prevent obturator reflex. They studied 112 patients with lateral bladder wall tumors and at high risk for general anaesthesia, categorized them randomly in three groups. In the first group (34 patients), after spinal analgesia was administered, the exact site of the obturator nerve was determined by nerve stimulation and 15mL of lidocaine HCl 2% was injected around the nerve. In the second group (31 patients), we determined the obturator nerve using nerve stimulation (like the first group), then 20mL of saline was injected. In the third group (47 patients), the obturator nerve was determined based on anatomic landmarks and blocked subsequently. Leg jerking was reported and compared in the three groups. Leg jerking was reported in 5.8%, 34%, and 6.3% of patients in the first, second, and third groups, respectively ($P = 0.0001$). ONB took 6.7 minutes in the first, 6.1 minutes in the second, and 5.2 minutes in the third group, on average. There was no report of adverse effects of lidocaine in this study. They concluded that trans-vesical ONB is a safe and effective method of ONB before TURBT and this method is feasible by urologists and promising even without nerve stimulation and only by anatomic landmarks.

MATERIALS AND METHODS:

A prospective, randomised, controlled, interventional, double blind study was done over 1 year (July 2023- June 2024). After obtaining Institutional Ethical Approval and informed written informed consent 100 adult patients of American Society of Anesthesiologists (ASA) physical status I, II and III, aged between 45 and 75 years undergoing TURBT involving the lateral wall under Spinal Anaesthesia with ONB were randomly allocated to two equal groups (n = 50) using random number method.

Inclusion Criteria-

- ASA grade I,II and III
- Age between 45 to 75 years
- Growth on lateral wall of urinary bladder

Exclusion Criteria-

- Patient refusal
- ASA status IV
- Pre-existing obturator nerve injury
- Infection at injection site

Preoperative assessment of the patients including history, general examination, systemic examination, assessment of the airway and spine was done.

All required investigations CBC, blood sugar, blood urea, serum creatinine, serum electrolytes, liver function tests, ECG and chest X-ray were done.

Monitoring- ECG, SpO₂, NIBP.

The procedure was explained to the patient and informed consent was taken. IV line was secured and preloading was done. The drip was continued throughout the length of the surgery.

Spinal Anaesthesia:

Under all aseptic, SA was administered in sitting position midline approach at the L3– L4 or L4-L5 space after confirming free-flow and clear cerebrospinal fluid with 2.2 cc 0.5% BUPIVACAINE (WITH DEXTROSE) + 20 mcg FENTANYL (total volume 2.6 cc). When the sensory level block reached above T10, ONB was performed. Depending upon the location of tumor, patients were given unilateral or bilateral ONB. Ultrasound and Peripheral nerve stimulator were used in all the cases to aid the accuracy and precision of the block.

The procedure of obturator nerve block was carried out under septic precautions and ultrasonographic guidance with aid of a peripheral nerve stimulator using 10 cm visioplex PNS needle.

Group I- Conventional Approach In Supine Position

With the patient in the supine position, the needle was inserted perpendicularly to the skin 3 cm lateral and 3 cm inferior to the pubic tubercle. The needle was advanced until contact was made with the inferior ramus of the pubis. The needle was withdrawn short of the tip and redirected in a lateral and slightly anterior direction, parallel to the superior ramus of the pubis. The needle was slowly advanced until a response to a nerve simulator was elicited.^[2,4]

Group II- Inter-adductor Approach In Lithotomy Position

With the patient in the lithotomy position, two lines on the skin were drawn at the adductor longus tendon and the pubic arch. An 8-cm, 22-gauge insulated needle was inserted 1cm behind the adductor longus tendon and 2cm lateral to the pubic arch. The inserted needle was advanced with a slight lateral and posterior inclination, while a nerve stimulator using continuous 1Hz, 2 mA was simultaneously employed. Once muscle twitch in the thigh adductor was visible and palpable, the amperage was lowered and the needle was advanced and/or redirected until stimulation recurred. This procedure was repeated until 0.4-0.5mA. A successful encounter with the obturator nerve resulted in contractions of the adductor muscles by 1mA or lesser electrical stimulation.^[1,3,4]

Total 10 cc of 0.7% Ropivacaine was used and 10 cm visioplex PNS needle was used to perform the block in all the cases.

Five minutes after the end of injection, the surgeon who was masked to group assignment entered the operating room to start TURBT and evaluate the motor blockade, which was graded as follows:

0=Adductor spasm

1=No adductor spasm

The strength of thigh adduction was measured at 5, 10, 15 min after injection, and a score of 1 was considered as a successful block. If spasm persisted after 15 min, the block was classified as failed.

Motor Block Onset Time: Time elapsed from the end of injection (time 0) until a motor block score of 2 was reached. Onset time was not recorded in failed blocks (when spasm persisted at 15 min).

Motor Block Success: The number of patients who had a score of 1 within 15 min after block placement.

Block Performance Time: The time elapsed between the start of PNS needle insertion and needle removal at the end of block.

The Ease Of Approach: Classified according to the number of needle redirections required to accomplish the block as follows:

Number of needle passes ≤2 – Easy
Number of needle passes >2–Difficult
Number of needle passes >5 – Failed.

Complications: The incidence of vascular puncture, hematoma, nerve injury, visceral injury was recorded.

GA with muscle relaxation and intubation was given in those cases where jerks of adductor muscle were elicited. Those requiring GA were excluded from the study and considered as failed ONB. Outcome was measured by the presence or absence of jerk when the surgeon resects on the lateral wall of the bladder.

Statistical Analysis:

Data was presented in terms of frequency and percentage for qualitative (categorical) variable and for quantitative variables, data was presented in terms of range (min, max), mean, SD. Median (Inter quartile range) in case data do not follow a normal distribution for both the groups separately.^[1,3]

The Quantitative variables like Time, BP, HR were calculated by Student t Test and Mann Whitney Test while other Qualitative variable assessment was done by Chi-square and Fischer Exact Test.^[2,3]

ANOVA with repeated measures will be applied to see overall significance (inter and intra) for quantitative variables and the level of significance will be taken as $p \leq 0.05$ and the data will be analyzed by using SPSS statistical software version 20.

OBSERVATIONS AND RESULTS:

Demographic data-

There were no statistically significant intergroup variations regarding age, body weight and gender distribution

Duration Of Surgery-

Duration of surgery was similar in both groups and statistically not significant.

Adductor Spasm-

In our study statistically significant occurrence of adductor spasm was noted in Group I compared to Group II ($p=0.0032$).

The number of patients who developed adductor spasm after giving ONB in Group I was 6 and that in Group II was 3. Hence, 6 patients in Group I and 3 patient in Group II encountered a failed block such that surgeon could not proceed with the surgery and GA had to be given and the patients were excluded from the study.

Block Characteristics:

	GROUP I	GROUP II	p-value
	(supine position, classical approach) N=50	(lithotomy position, Inter-adductor approach) n=50	
AGE	64.23±3.48 yrs	66.22±1.22 yrs	0.88
DURATION OF SURGERY	120.54±2.43 min	118± 6,12 min	0.924
SUCCESS RATE	44/50	47/50	0.0032
BLOCK PERFORMANCE TIME	8.52±1.22 min	6.38±3.08 min	0.0014

NUMBER OF PATIENTS REQUIRING >2 NEEDLE PASSES	12	9	0.005
COMPLICATIONS	NIL	NIL	

Number Of Needle Passes-

In our study the number of needle passes required to give ONB was significantly more with patients in Group I - 12 compared to Group II where only 9 required needle passes more than 2. Needle passes >2 categorized as "difficult" and were required in more number of patients in Group I.

Block Performance Time-

The mean duration of time to give ONB in Group II was markedly lower (6.38 ± 3.08 min) as compared to Group I (8.52 ± 1.22 min)

Intra-operative Vitals-

In present study, the intra operative pulse rate and systolic blood pressure remained stable without any significant intergroup fluctuations.

Complications-

No complications were observed in either of the groups.

DISCUSSION:

Our study has shown that the obturator nerve block after spinal anaesthesia is safe and convenient for trans urethral resection of bladder tumors. Under USG and PNS guidance ONB is simple to perform be it by conventional or inter-adductor approach. It avoids General anaesthesia and its associated complications.

We observed that USG and PNS guided obturator nerve block by inter-adductor approach in lithotomy position is better than ONB by conventional approach in supine position in being significantly easy, less time consuming and with higher success rate. The higher accuracy of USG guided block can be attributed to faster identification of nerve by direct visualization of fascial planes and to the point drug administration.

Modic and Maldini et. al, conducted a study to compare inter-adductor approach to obturator nerve block for transurethral resection procedure of bladder tumours with traditional approach using poth USG and PNS to aid block accuracy similar to our study. The success rate, completion of the block, and plasma lidocaine concentrations were similar with both approaches. They concluded that the inter-adductor approach can provide faster identification of the obturator nerve than the traditional approach. The results of their study was in consensus with the results of our study.

Rodrigo and Ramson et al. in their study on 100 ASA III patients for TURBT concluded that ONB is an effective method of preventing adductor spasm and the associated complications is patients undergoing trans urethral resection of bladder under spinal anaesthesia.

L. Martinez and D. Olmo et. al, prospectively studied the obturator nerve blockade in TURBT under spinal anesthesia, by the inter-adductor approach with the patients laying in lithotomy position in 189 patients using interadductor approach with 10 mL of 2% Lidocaine. 174 (92.06%) blockades were recognized as successful, 9 (4.76%), as satisfactory and in 6 (3.18%) cases there were no blockade. They did not observe any complications related to the blockade.

Pepe et al, conducted a prospective study over 90 patients to assess the efficacy of ONB performed using PNS vs USG during TURB under spinal anesthesia. In these cases nerve stimulation and ONB with 2% lidocaine using thigh interadductor approach in the lithotomy position were performed. The results of their study were in consensus with results of our study.

Klose et al. administered obturator nerve block with spinal anesthesia and observed for development of adductor spasm. Out of 25 patients given SA with ONB, 24 patients resulted in complete ablation of spasm and 1 resulted in approximately 80% reduction of adductor spasm, and in the group given only SA bladder perforation occurred in 2 patients and emergency exploratory laparotomy had to be done in one patient.

In a study done by N. Williams and E. Fernandez et al. successful motor block at 15 min of injection of LA, was achieved in 23 out of 30

patients in Group I (classical approach), and 27 of 30 patients in Group II (inter-adductor lithotomy approach) with a success rate of 76.7% and 90%, respectively. However, the difference was statistically insignificant.

CONCLUSION:

Our study has shown that the obturator nerve block after spinal anaesthesia is safe and convenient for trans-urethral resection of bladder tumors. Whether ONB is given by conventional or inter-adductor approach, it is simple to perform and avoids General Anaesthesia and its associated complications. In Our study we observed that USG and PNS aid the accuracy of block. We observed that ONB administered by inter-adductor approach in lithotomy position is better than ONB given by conventional approach in supine position being significantly easy, less time consuming and with higher success rate.

Limitations Of Our Study:

- 1) ASA IV patients were excluded from the study. Although regional alternatives to general anaesthesia is more desirable in high risk cases.
- 2) Bigger sample size would have yielded more accurate results.
- 3) All the techniques of obturator nerve block like the three in one block should be compared to conclude the best technique.
- 4) Although, PNS and USG were used to aid the efficacy and precision of the block but not much importance was given to blocking both the anterior division and posterior division of the nerve separately.

REFERENCES:

- [1] D. olmo et. al: Impact of nerve stimulator-guided obturator nerve block on the short-term outcomes and complications of transurethral resection of bladder tumour: A prospective randomized controlled study. CAUJ. 2015 Nov-Dec; 9(11-12): E780– E784.
- [2] Rodrigo et. al:A new ultrasound-guided pubic approach for proximal obturator nerve block: clinical study and cadaver evaluation. Journal of the AAGAI/2015.
- [3] Maldini et. al: Obturator nerve block transurethral surgery for bladder cancer: comparison of inguinal and intra vesical approaches: prospective randomized trial. IJMS/(1971-),August2016, Volume 185, Issue 3, pp 555–560.
- [4] Nico et al. Obturator Nerve Block in Transurethral Resection of Bladder Tumor: A Comparative Study by two Techniques. Anesth Essays Res. 2017 Jan-Mar; 11(1): 101–104.
- [5] Pepe et .al: Obturator Nerve Block (ONB) in Trans Urethral Resection of Bladder Tumors (TURBT) .JUMDC volume 4, no. 2, jul-dec 2013.