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A Comparative Study on the Efficacy of Ultrasound Guided Versus Ultrasound with Nerve Stimulator Guided Obturator Nerve Block in Transurethral Resection of Bladder Tumour

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Abstract: *Aim: To study the efficacy of obturator nerve block for Transurethral resection of bladder tumor using ultrasound guided technique versus ultrasound guided with nerve stimulator.*
Material and methods: Study included 60 patients with lateral bladder wall tumor of ASA grade 1 and 2 undergoing TURBT were divided into 2 groups 30 each. Group A(n=30) received 5ml of 0.5%bupivacaine in the anterior and posterior division of obturator nerve under USG guidance. Group B (n=30) received the same amount of drug under USG+PNS guidance. we used two sample independent t-test, Pearsons chi-square test
Results: Onset of motor block was faster in Group B than Group A, success of block was 90%in Group B when compared to 75%in Group A. But the block performance time was prolonged in Group B compared to Group A. Surgeon satisfaction was better in Group B than Group A.
Conclusion: we conclude that both techniques are safe and easy to perform but USG+PNS gp has rapid onset and higher success rate when compared to USG alone technique.
Keywords: *Bladder tumor, Peripheral nerve stimulator, Obturator nerve block, Obturator reflex, Ultrasound.*

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I. Introduction

With the advent of Transurethral resection of bladder (TURBT) for early lateral and posterior wall bladder cancer under spinal anesthesia, there were complications due to obturator nerve inadvertently getting stimulated causing bladder perforation and complications. Since the introduction of peripheral nerve block techniques, lot of improvements have been given to by using nerve stimulators and ultrasound (USG) guidance to improve the accuracy and selectivity of nerve blocks

Labat in 1922 introduced the selective obturator nerve block, since then lot of refining of methods were done to improve the accuracy which was mainly used for pain relief in paraplegia patients in reliving the obturator nerve spasm also in other CVA patients and multiple sclerosis, medullary problems, and also in patients undergoing transurethral surgery to avoid painful hip conditions.

Obturator nerve is formed from the anterior primary rami of L2-L4roots and descends to the pelvis on the medial side of psoas muscle, anterior branch lies between adductor longus and brevis. posterior branch lies between fascial planes of adductor brevis and magnus. In USG guided block we use a linear transducer (5-13)mhz and patient was positioned in supine posture with thigh slightly abducted and laterally rotated.

II. Materials and Methods

A prospective, randomized, double blinded study was conducted in the Department of Anesthesiology in Dharmapuri Medical College from 2018 august to 2019 august, after getting approval of ethical committee and written informed consent from all the 60 patients.

2.1 Inclusion criteria:

2.2 Exclusion criteria

1. Patients of ASA gr III and gr IV
2. Coagulation disorders.
3. Patients with inguinal lymphadenopathy.
4. Any infection in the inguinal area.
5. Allergic to local anaesthetics.

All patients are evaluated with the routine investigations and pre-assessment done. All were given spinal anaesthesia with 25G quinkes needle at L3-L4 space in sitting posture and 2.5ml of 0.5%sensorcaine

given. Level of block checked after placing in supine posture at 15minute, then the leg was slightly abducted(30degree) and externally rotated. The inguinal region was prepared with 2%chlorhexidine solution and USG linear probe was used to visualize the anterior and posterior divisions of obturator nerve between the three muscle layers(add longus, brevis &magnus)2-4cm below the inguinal crease.

GROUP A (USG): A 22G 10cm insulated needle was inserted under USG guidance by out of plane approach to reach the anterior division of obturator nerve located between adductor longus and brevis. After negative aspiration 5ml of 0.5%bupivacaine given, then needle was withdrawn and injected towards the posterior division of obturator nerve between adductor brevis and magnus another 5ml given.

GROUP B (USG+PNS): In this group patients received obturator nerve block under ultrasound guidance with nerve stimulator-started with a current of 2-3MA and reduced to 0.5MA.after seeing muscle contraction in the medial aspect of thigh drug was given and current was reduced to 0 and needle redirected to the posterior division and current increased to 0.5MA seeing contraction in the posterior aspect of thigh next 5ml drug given.10min after the injection surgeon was allowed to evaluate the motor blockade.

It was graded as

0-Adductor spasm

1-50%decrease in adductor spasm.

2-no adductor spasm.

Score of 2 taken as successful block after 20min.Following were recorded

1. Motor Block onset time: Time elapsed from the end of injection till score of 2 is reached. Block was taken as failed if time taken was more than 20 minutes.
2. Motor block success: Number patients who had a score of 2 within 20 minutes of injection.
3. Block Performance Time: Time taken between start of ultrasound and needle removal at the end.
4. Ease of approach: Based on number of needle redirections

a. Less than 2
b. Between 2-5
c. More than 5

5. Surgeon satisfaction
6. Complications: Injury to vessel, nerve, hematoma, visceral injury if present were noted.

The results obtained were analyzed using sample independent t-test and Pearson's chi square test and a P value of less than 0.05 (P< 0.05) was considered statistically significant.

III. Results

The demographic data were comparable without any significant variation. (Table.1)

Table.1 Demographic data

Groups	n	Age (years)		Sex	
		Age range	Mean ± SD	Male	Female
Group A	30	35 - 69	54.7± 8.66	26	4
Group B	30	34 - 68	53.6 ± 8.58	27	3
P		0.458		1.00	

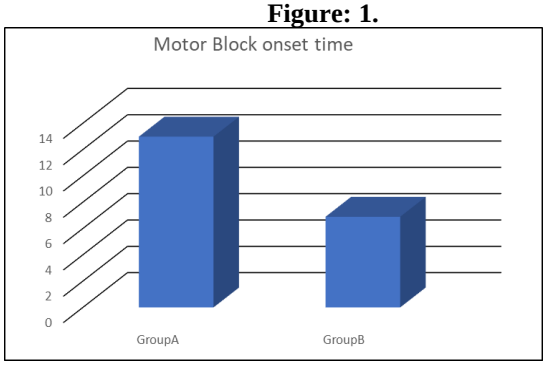
n = Number, SD = Standard deviation (P> 0.05)

Table.2 Motor Block onset time.(min.)

Groups	N	Mean ± SD	P value
Group A	22	12.98 ± 2.56	0.0001
Group B	28	6.89 ± 2.42	

P <0.05

Figure: 1.



The motor block onset time between the 2 groups is significant. Group A had higher failure rate and took more time for onset of action compared to group B. (Table.2 & 3) Figure: 1

Table : 3 Motor Block success percentage.

Block outcome	Failed	Successful	Percentage
Group A	8	22	73.34
Group B	2	28	93.34

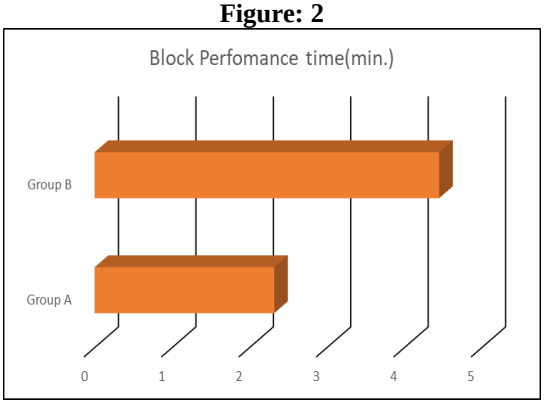
The block success rate is significantly higher in ultrasound with nerve conduction study, even though the time taken in this group is higher.

Table :4 Block performance time (min.)

Block performance time	n	Mean ± SD	P
Group A	30	2.32 ± 0.51	0.0001
Group B	30	4.45 ± 0.72	

n - number SD – Standard deviation (P <0 .05)

Figure: 2



The block performance time is significantly higher in the group B that is combined procedure carries a good performance. (Table: 4) Figure:2

Table: 5. Ease of approach to perform block.

Ease of approach	Number of needle passes	Groups		Percentage
		A	B	
Easy	1-2	20	18	38
Difficult	2-10	10	12	22

P = 0.789

As for the ease of approach is concerned there is no significant difference.

Table: 6. Patient satisfaction.

	Group A	Group B	Total (%)
Yes	4	1	5 (8.3)
No	26	29	55(91.7)

P value 0.353

Table: 7. Surgeon satisfaction.

	Group A	Group B	Total (%)
No	7	3	9(16.6)
Yes	23	27	51(83.3)

P Value 0.299

As for patient and surgeon satisfaction there is no statistically significant difference observed

IV. Discussion

The above results show that peripheral nerve block using nerve locater is a cost-effective technique and it avoids the side effects of general anaesthesia. Nerve stimulation using locater depends on the nearness of needle tip to the nerve and useful if the nerve is difficult to visualize in ultrasound. Obturator nerve is one such nerve, stimulation of which during surgery can cause sudden contraction of adductors leading to bladder perforation and bleeding. Another technique to prevent this is GA with muscle relaxants. This present study we compared obturator nerve block success under ultrasound guidance with (Group B) and without (Group A) peripheral nerve stimulator. Both the groups are comparable according to demographic data. In our study motor block was seen at 5, 10, and 15 minutes from the time of injection of 0.5% of Bupivacine. The onset of motor block was faster in Group B compared with Group A.

In a study conducted by *Rajesh V Nagmothe et.al.* [1] on the efficacy of Obturator Nerve Blocks using nerve stimulator in TURBT under spinal anaesthesia showed supplemented obturator nerve block using nerve stimulation technique for TURBT under spinal anaesthesia reduced the complication of bladder perforation and bleeding by abolishing the adductor muscle jerk. This study is comparable with the results of the present study.

Recai Dagli et.al.[2] in their study of comparison of classic and inguinal nerve blocks applied for preventing adductor muscle contractions in Bladder Tumor surgeries and concluded that inguinal approach was faster and easier to perform with less failure. Which supports the evidence in our study for lesser complication and ease of approach in performing the Nerve Block.

In clinical study of New Inguinal Approach for Obturator Nerve Block by *Olivier Choquet et.al.* [3] the inguinal approach was compared with pubic tubercle approach for Obturator Nerve Block showed there is no significant difference in performance time between groups. It supports the present study of performance of inguinal approach for Obturator Nerve Block is safe and easier to perform.

A comparative study "Comparison between blind and nerve stimulation guided Obturator Nerve Block in Transurethral Resection of Bladder Tumor." by *Mohammadhatef Khorrami et.al.* [4] showed that Obturator Nerve Block using anatomical landmarks is faster and easier when compared with nerve stimulation guided blocks but the complications even though slightly higher the results are comparable and promising. But our study aims for safer approach even if it is time consuming.

Kuo JY.[5] In his study : Prevention of obturator Jerk during transurethral resection of bladder tumor showed that nerve stimulated technique is better than blind method even though it is not 100 percent successful it reduces the dosage of anesthetic requirement which correlates well with our results

In their study *Mydlo JH, Weinstein R, Shah S, et.al,*[6] on the Long-term consequences from bladder perforation and/or violation in the presence of transitional cell carcinoma: showed perforation and violation is common occurrence, this validates our usage of obturator nerve block in TURBT.

A study on Obturator nerve block and transurethral surgery for bladder cancer by *Tatlisen A et.al.*[7], showed reduction in later wall bladder injury in TURBT by using ONB even if done with blind technique which add value to our study in using ONB.

Hradec E, Soukup F, Novák J, Bures E. [8] The obturator nerve block. Preventing damage of the bladder wall during transurethral surgery. Similar results as above was obtained supporting the usage of ONB in bladder surgery.

Akata T, Murakami J, Yoshinaga A. [9] published a case of Life-threatening haemorrhage following obturator artery injury during transurethral bladder surgery: A sequel of an unsuccessful obturator nerve block. Indicating the need for precise technique for obturator nerve block to prevent the complications, which supports our use for both ultrasound and nerve stimulation guided block.

Dingemans E, Williams SR, Arcand G, Chouinard P, Harris P, Ruel M, et al. [10]in their prospective randomized trail on Neurostimulation in ultrasound-guided infraclavicular block, showed that success rate of nerve block was significantly improved by using ultrasound guidance rather than blind technique, which supports our results in use of image guidance.

Manassero A, Bossolasco M et.al. [11]in their study of Ultrasound-guided obturator nerve block: Interfascial injection versus a neurostimulation-assisted technique. Showed that in ultrasound-guided obturator nerve block performed after the division of the nerve, injection of local anesthetic between the planes of the adductor muscles is comparable to nerve stimulation. But they commented that medial circumflex vessels injury is less in controlled technique. Supporting the usage of nerve stimulation in our study.

Sinha SK, et.al.[11] in their paper on Ultrasound-guided obturator nerve block: An interfascial injection approach without nerve stimulation. Showed Obturator nerve block using USG to achieve interfascial injection without nerve stimulation had success similar to that reported in studies using nerve stimulation. Rendering support in usage of ultrasound.

V. Conclusion

We conclude that both the techniques are safe and ease to perform but there is faster onset of action of Nerve Block in the case of Ultrasound with Nerve stimulation guided Obturator Nerve Blocks. Patient and Surgeon satisfaction were better in Ultrasound with Nerve stimulation technique.

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