Nat. Volatiles & Essent. Oils, 2021; 8(6): 2366-2374

NVEO
Natural Volatiles &
Essential Oils

Ultrasound Guided Obturator Nerve Block (Two Branches) With Spinal Anesthesia In Transurethral Resection Of Bladder Tumor

Hayder Alkayssi and Waleed Nassar Jaffal

University of Anbar, College of Medicine, Iraq

Abstract

Background: patients with bladder tumor mostly treated surgically with transurethral resection (TURBT). For anesthetic aspect, general anesthesia and/or neuroaxial block could be done, but spinal anesthesia is the most common procedure takes a place in the theatre. During cauterization (electro-resection) of the tumor the obturator nerve (L2, L3 & L4) will be stimulated resulting in thigh adductor jerk (as it passes through the infero-lateral wall of the bladder). In some patients, the adductor jerk (reflex) may cause unwanted complications such as bleeding and bladder wall perforation. Obturator nerve block is a successful measure to prevent this incidence intra-operatively.

Methods: 42 eligible (adult age and above) patients, randomly divided into two groups, both received spinal anesthesia with hyperbaric bupivacaine (0.5%) 3 ml. The 1st group (A) has been intervened with obturator nerve block (anterior branch) with 3 ml of plane bupivacaine 0.5%. The 2nd (B) group has been intervened with obturator nerve block (both anterior and posterior branches) with 3 ml of plane bupivacaine 0.5% for each branch. Timing of the procedure and surgery, adductor jerks closed monitored by both the surgeon and the anesthetist, bladder perforation, bleeding also recorded by the surgeon.
Results: The adductor jerk (during cauterization of the tumor) was obviously absent in most of the patients in group B, also the bleeding was reduced to a convenient level by the surgeon.

Conclusion: Based on this study, obturator nerve block (two branches) is necessary for patients' underwent transurethral resection of the bladder tumor with low volume and prolonged timing local anesthetic agent, especially if the tumor invades the lateral or inferolateral wall of the urinary bladder.

Keywords: Transurethral resection of bladder tumor (TURBT); obturator nerve, adductor jerk, OR.

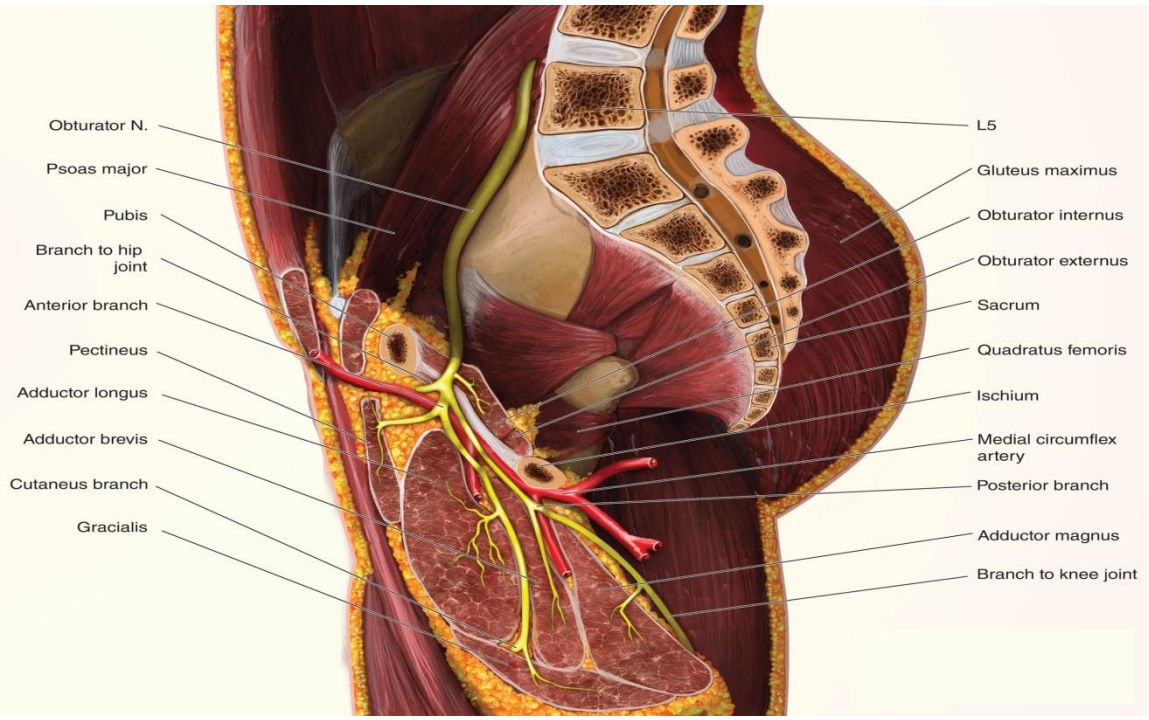
Introduction

Firstly, I quote Labat's statement "obturator nerve block combined with blocks of the sciatic and femoral nerves, anaesthetized the entire lower limb". For the last three decades, regional anesthesia considered the keystone for many surgeries and preferred over the general ones, especially the advantages for the intra and post-operative aspects such providing intense

analgesia, lowering the blood loss, decrease (enteral & parenteral) analgesics, low opioids requirement post-operatively, less time needed to stay in the recovery room or even hospitalization and the most important point is the functional recovery (early ambulation post-operatively). With spinal anesthesia, the obturator nerve (L2, L3 and L4) stimulated by impulses from cauterization of the tumor during TURBT causing unwanted harmful adductor thigh reflexes, so obturator nerve block (ONB) has been done to prevent adductor jerk so lowering further complications.[Labat ,1922;Swenson,2006; Sinha et.al., 2009; Jonathan,2012; Morris et.al.,2017].

The 1st ONB description was in 1922 by Gaston Labat et al, then different studies showing different techniques performed to localize the nerve by anatomy landmarks as it passes proximal to the inferolateral wall of the urinary bladder, bladder neck and prostatic urethra. So even with spinal anesthesia, adductor jerk happens by stimulation of obturator nerve during cauterization of the tumor (especially the lateral wall).[Labat ,1922 and Jonathan,2012].

Urological view, the bladder cancer considered the ninth most common malignancy hit the males and females at the age of 75 years and above all over the world. The surgery stays the main treatable way for bladder malignancies by either transurethral removal of the mass or by resection the whole bladder (cystectomy).[Junne-Yih,2008; Karolina et.al.,2010; Ciechomski et.al., 2002; Morris et.al.,2917; Jochum et.al.,2014 and Fujita et.al.,2017]



The obturator is a large mixed (motor and sensory) nerve, it arises from the ventral rami of L2, L3 and L4 at the lumbar plexus, it descends vertically with psoas muscle and at the level of sacroiliac joint (L5) it crosses into the pelvis under the common iliac vessels running anterior/lateral to the ureter. At this point, it is close to infero-lateral part of the bladder wall. Then, it will be anterior to the obturator vessels within obturator foramen (upper part). It runs out the pelvis below pubic ramus, passing obturator canal before entering the adductor region of the thigh. Then, then the nerve divides into anterior and posterior branches in the obturator canal (52%) of cases. The anterior division supplies adductor longus, adductor brevis and gracilis as well as sensory branches to the medial mid-thigh. While the posterior division supplies

obturator externus (piercing it) and adductor magnus [Labat ,1922 and Jonathan,2012 Bochenek and Reicher 1989; Junne-Yih, 2008 and Karolina et. al.,2010] (Figure 1).

Fig.1: The course and divisions of the obturator nerve and its relationship to the adductor muscles [Sam et.al., 2021].Although the successful blind block reaches (70-90) %, it is considered safe but still there may be some neurological and neighboring parts damage. Ultrasonography is still a hopeful option to get a direct visible target with minimizing complications.[Bouaziz et. al.,2002; Macalou et. al.,2004 and Marhofer et. al.,2010]. Blocking both divisions of the obturator nerve with a long acting local anesthetic and small volume reaching the convenient level of abolishing the obturator jerk, decreasing blood loss, avoiding bladder wall perforation [McNamee et.al.,2002 and Wassef ,2019].

Methods

Clinical trial consists of adult patients was underwent in order to observe the outcome of two main anesthesia procedures. Patients were randomly divided into two groups, both received spinal anesthesia with hyperbaric bupivacaine (0.5%) 3 ml.

The 1st group (A) has been intervened with obturator nerve block (anterior branch) with 3 ml of plane bupivacaine 0.5%.

The 2nd (B) group has been intervened with obturator nerve block (both anterior and posterior branches) with 3 ml of plane bupivacaine 0.5% for each branch.

Timing of the procedure and surgery, adductor jerks closed monitored by both the surgeon and the anesthetist, bladder perforation, bleeding also recorded by the surgeon.

After patients are informed and signed the consent form, they registered in the randomized clinical trial research.

Inclusion criteria: 60 years old and above, oriented, fully cooperative, no genders bias, ASA (I, II, and III), no blood thinners taken, no history of addiction, no premedication, uneventful spinal anesthesia and they had 1 mg midazolam prior to the obturator nerve block for both groups.

Exclusion criteria: prolonged surgery and combined general anesthesia.

Block Evaluation

The onset of motor blockade is seen after 5-7 minutes after administration of 0.5% bupivacaine, evaluation of obturator sensory blockade is unreliable due to variability of sensory distribution. Motor blocked assessed by Squeeze Adductor Test which is simply done by pre-inflated sphygmomanometer up to 40 mm Hg, inserted between lower thighs and asking the patient to squeeze the cuff of the device [Snaith and Dolan , 2010 ; Soong,2007and Taha, 2012].

Results

All categories of variables Jerk, Bleeding and Perforation were cross tabulated with respect to groups A and B as shown in table 1. Such a tabulation is very important to observe the occurrence of cases from both groups in the different cells of the table. Perforation is found to be occurred only in the bleeding cases from group A. The incidence of perforation in group A was 10% (two cases, one of them corresponds to the Tonic and the other to the Tonic/Clonic type of Jerk), and 5% in group B (only one case corresponding to Tonic type of Jerk).

Odds ratios for bleeding, Jerk and perforation were calculated with respect to groups A and B and results are listed in table 2. For the Jerk variable, since group B has no cases for the type Tonic/Clonic, the types Tonic and Tonic/Clonic of group A were collapsed into one category as “Present”, i.e., either Jerk is present or absent, this is indeed to facilitate for a logical comparison with group B.

Table 1. Cases from groups A and B where cross-tabulated according to the categorical data of the study.

								Count
Group	A	Jerk	No	Bleeding	No	Perforation	No	12
							Yes	0
					Yes	Perforation	No	0
							Yes	0
			Tonic	Bleeding	No	Perforation	No	1
							Yes	0
					Yes	Perforation	No	5
							Yes	1
			Tonic/Clonic	Bleeding	No	Perforation	No	0
							Yes	0
					Yes	Perforation	No	1
							Yes	1
	B	Jerk	No	Bleeding	No	Perforation	No	18
							Yes	0
					Yes	Perforation	No	0
							Yes	0
			Tonic	Bleeding	No	Perforation	No	1
							Yes	0
					Yes	Perforation	No	1
							Yes	1
			Tonic/Clonic	Bleeding	No	Perforation	No	0
							Yes	0
					Yes	Perforation	No	0
							Yes	0

In order to compare the performance of the surgical methodologies in groups A and B, Odds-ratios (OR) were calculated. The 95% confidence intervals were calculated for each OR together with the p-value. Results of OR and the associated indications are listed in table 2.

With respect to bleeding, patients in group A are found to be significantly more likely to be exposed to bleeding than those in group B, they are 5.85 times more likely to have bleeding than those in group B.

In this context, patients in group A found to be significantly 4.5 times more likely to develop Jerk than those in group B.

Odds ratio reveals no significant difference between groups A and B with respect to perforation. That is, perforation from statistical point of view has almost similar chance to occur in either group (p-value=0.557).

Time of surgery was considered for both groups and t-test for the comparison of two-means was applied in different occasions as mentioned in table 3. Results of this test showed that patients in groups A and B on the average required similar mean surgical time. The table also

showed that on the average, when jerk and/or bleeding occurred surgery takes significantly longer time in both groups.

Table 2. Odds Ratio for all categories of the selected variables in both groups.

Groups	Bleeding		Total	A:B OR	95% C.I.		p-value
	Yes	No			Lower	Upper	
A	8	13	21	5.85	1.06597	32.10455	0.0421
B	2	19	21				
Total	10	32	42				
Groups	**Jerk**		**Total**	**A:B OR**	**95% C.I.**		**p-value**
	Prersent	Absent			Lower	Upper	
A	9	12	21	4.5	1.007128	20.10668	0.048
B	3	18	21				
Total	12	30	42				
Groups	**Perforation**		**Total**	**A:B OR**	**95% C.I.**		**p-value**
	Prersent	Absent			Lower	Upper	
A	2	19	21	2.11	0.176475	25.22793	0.557
B	1	20	21				
Total	3	39	42				

Table 3. Results of the two-sample t-test.

Groups	Mean±S.d.	t-test	p-value
A	86.9±16.77	1.32	0.2
B	78.6±22.60		
Jerk	**Mean±S.d.**	**t-test**	**p-value**
Present	102.10±17.50	-4.65	0.0002
Absent	75.20±15.50		
Bleeding	**Mean±S.d.**	**t-test**	**p-value**
Yes	105.50±15.70	-5.23	0.0001
No	75.80±15.60		

One may conclude that there are significant differences between the two surgical methodologies with respect to bleeding and jerk. In this context one can confidently say that surgical methodology of group B is preferable to that of group A.

Discussion

Spinal anesthesia is done by using 3 ml (15 mg) of heavy (hyperbaric) bupivacaine at the level L3-L4 or L4-L5. Using linear probe (6-15 MHz), scanning just under the inguinal ligament to obtain cross sectional view of the femoral neuro-vascular bundle, sliding medially to visualize pectineus muscle which is the first muscle will appear and considered the guidance to obtain nearby muscles (adductors longus, brevis and magnus). After aseptic technique, the sonography confirmed injection site for the anterior branch located between adductor longus and adductor brevis, injection of 3 ml of isobaric (plane) bupivacaine in the first group (A), another 3 ml was

injected to the posterior branch located between the adductor brevis and adductor magnus at the second group (B).[Shiozawa ,2002and Deliveliotis et. al.,2005].

The bleeding was accepted for the level of the ABL (allowable blood loss), unless the cases recorded as bleeding those who needed blood replacement at least one unit, which happened in four cases in group (A) and in two cases in group (B).

The adductor reflex (jerk) was recorded in four cases in the first group (A) as tonic (spastic) adductor muscles; two of them were also clonic (jerky). While just three cases recorded as tonic reflexes in the second group (B).

Bladder perforation (in both groups) fortunately happened extra-peritoneal that didn't need to open surgically. Two cases were recorded bladder perforation in group (A) and one patient in group (B).

The time of surgery is at a level of 90 minutes for most of urologists in Anbar territory in Iraq. Five procedures passed 90 minutes in group (A), while four surgeries passed the limit time in group (B).

Close monitoring for the all the patients is an important factor to make the study valid, as during the block of the two branches has no time consuming or complication recorded.

Conclusion

Based on our research results, blocking of both obturator nerve branches preferred on just anterior branch for less complication in TURBT and having better knee pain relief post-operatively. Ultrasonography made the regional anesthesia visible procedure with minimizing complication.

Eventually, none of the patients experienced complications from anesthetic procedures.

Acknowledgement

My best urologist colleague: **Dr. Waleed Nassar Jaffal** for consultation, collecting cases and recording data, **Dr. Murtadha Jubara** for consultation, designing the experiment and following the procedure.

Reference

Bochenek A. and Reicher M. 1989. Human Anatomy, Warszawa, PZWL, vol. V: 113-6

Bouaziz H, Vial F, Jochum D, et.al., 2002. An evaluation of the cutaneous distribution after obturator nerve block. Anesth Analg;94:445–449.

Ciechomski M, Jureczko L, Mayzner Zawadzka E. 2012. Obturator nerve block during transurethral procedures. Anesth. Int.; 34 Vol. I: 192-193

Deliveliotis C., Alexopoulou K., Picramenos D., et. al., 2005. The contribution of the obturator nerve block in the transurethral resection of bladder tumor. Acta. Urol. Belg.; 63:51–54.

Fujita Y, Kimura K, Furukawa Y, et al,. 2017. Plasma concentrations of lignocaine alter obturator nerve block combined with spinal anaesthesia in patient undergoing transurethral resection procedures. Br J Anaesth;68:596–598.

https://www.nysora.com/techniques/lower-extremity/obturator/ultrasound-guided-obturator-nerve-block

Jochum D. Iohom G, Choquet, et al,.2014. Adding a selective obturator nerve block to the para-sacral sciatic nerve block: an evaluation. Anesth. Analg.;99:1544–1549.

Jonathan Anson,.2012. Assistant professor of Anesthesiology, Milton S. Hershey Medical Center, clinical trials identifier NCT number: 01547637.

Junne-Yih Kuo.2008. Prevention of Obturator Jerk during Transurethral Resection of Bladder Tumor. JTUA; 19:27-31

Karolina Pladzyk, Lidia I. Jureczko, Marcin Ciechomski and Tomasz łazowski.2010. Obturator nerve block in lithotomy position for (TURBT), BJA: British Journal of Anaesthesia, Volume 105, Issue e-Letters Supplement, 21 December.

Labat G.1922. Regional Anesthesia: Its Technique and Clinical Application. Philadelphia, PA: Saunders.

Macalou D, Trueck S, Meuret P, et. al., 2004. Postoperative analgesia after total knee replacement: the effect of an obturator nerve block added to the femoral 3-in-1 nerve block. Anesth Analg;99:251–254.

Marhofer P, Harrop-Griffiths W, Willschke H. and Kirchmair L. 2010. Fifteen years of ultrasound guidance in regional anaesthesia: part 2—recent developments in block techniques. Br J Anaesth;104:673–683.

McNamee DA, Parks L. and Milligan KR. 2002. Post-operative analgesia following total knee replacement: an evaluation of the addition of an obturator nerve block to combined femoral and sciatic nerve block. Acta Anaesthesiol Scand;46:95–99.

Morris GF, Lang SA, Dust WN, et al. 2017. The para-sacral sciatic nerve block. Reg. Anesth;22:223–228.

Sam Van Boxstael, Catherine Vandepitte, Philippe E. Gautier, and Hassanin Jalil.2021.Ultrasound of the musculoskeletal system.

Shiozawa H. 2002. A new transurethral resection system: operating in saline environment precludes obturator nerve reflex. J. Urol.; 168:2665–2657.

Sinha SK, Abrams JH, Houle TT, Weller RS. 2009. Ultrasound-guided obturator nerve block: an intra-fascial injection approach without nerve stimulation. Reg. Anesth. Pain Med. May-Jun;34(3):261-264.

Snaith R. and Dolan J. 2010. Ultrasound-guided inter-fascial injection for peripheral obturator nerve block in the thigh. Reg. Anesth Pain Med;35: 314–315.

Soong J., Schafhalter-Zoppoth I. and Gray AT. 2007.Sonographic imaging of the obturator nerve for regional block. Reg Anesth Pain Med;32: 146–151.

Swenson JD, Bay N, Loose E, Bankhead B, Davis J, et. al., .2006. Outpatient management of continuous peripheral nerve catheters placed using ultrasound guidance: An experience in 620 patients. Anesth Analg 103: 1436-1443.

Taha AM. 2012. Brief reports: ultrasound-guided obturator nerve block: a proximal inter-fascial technique. Anesth Analg;114:236–239.

Wassef MR. 2019. Inter-adductor approach to obturator nerve blockade for spastic conditions of adductor thigh muscles. Reg. Anesth. Jan-Feb;18(1):13-7