Brief Report

Classic versus Inguinal Approach for Obturator Nerve Block in Transurethral Resection of Bladder Cancer under Spinal Anesthesia: A Randomized Controlled Trial

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Abstract

Single spinal anesthesia in transurethral resection of bladder tumor (TURBT) has been reported to be unable to prevent obturator nerve stimulation and adductor muscle contraction, which can cause complications like bladder perforation. The present study aimed to compare the effectiveness of the classic and inguinal approaches for obturator nerve block (ONB). Seventy patients with cancers of the lateral wall of the bladder, scheduled to undergo TURBT at Imam Reza Hospital (Tabriz, Iran) during a 6-month period as of June 2016, were randomly allocated to groups of inguinal and classic methods (n=35). After the infusion of 500 mL of normal saline, spinal anesthesia was commenced using 3 mL (15 mg) of bupivacaine. Then ONB was performed using 10 mL of 1% lidocaine via the inguinal or classic approach in the inguinal group or the classic group, respectively. The success rate, defined as lack of post-block contraction with stimulation or during surgery, number of puncture attempts, time of block onset, and patient and surgeon satisfaction, was compared between the 2 methods using SPSS, version 19.

The success rate of ONB was significantly higher in the inguinal group (97.1% vs. 71.4%; P=0.003). The number of puncture attempts in the classic group was more than that in the inguinal group (3.71±1.10 vs. 1.66±0.68, respectively; P<0.001). The block onset time was shorter in the inguinal group (1.5±0.66 min vs. 2.9±1.18 min; P<0.001). Dissatisfaction of the patient (19 cases vs. 2 cases) and the surgeon (10 cases vs. no case) was higher in the classic group (P<0.001).

Compared to the classic approach, the inguinal approach for ONB appeared to be an easily performable, effective block with a high success rate, rapid onset, and good patient and surgeon satisfaction.

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Keywords ● Obturator nerve block ● Urinary bladder neoplasms ● Transurethral resection ● Inguinal approach ● Classic approach

What's Known

- Obturator nerve block (ONB) is used to prevent electrocautery stimulation of this nerve and thus reduce complications during bladder surgery. There are some methods for ONB, the most frequent of which are the classic method and the relatively new inguinal method, with undefined success and patient and surgeon satisfaction rates.

What's New

- Compared to the classic method for ONB, the inguinal method is an easily performable procedure with high success rates, few puncture attempts, rapid onset, and high patient and surgeon satisfaction.

Introduction

Transurethral resection of bladder tumor (TURBT) is the key diagnostic modality to determine whether patients have bladder

cancer.[1] This technique is performed with a resectoscope, which usually uses electrical currents. Especially in cancers involving the lateral wall of the bladder, the resectoscope may stimulate the obturator nerve. Spinal anesthesia blocks the motor part of the obturator nerve; however, the sensory part of the obturator nerve may not be blocked and it may cause jerks. The obturator nerve passes close to the lateral wall of the bladder, and its stimulation may result in thigh adductor muscle contraction, which could be associated with undesirable complications such as bladder perforation, vascular injuries, incomplete cancer resection, and obturator muscle hematomas.[2-4] There are several strategies to prevent TURBT complications; they include avoiding complete filling of the bladder, decreasing the intensity of the electrocauter, using laser resectors, performing general anesthesia in combination with neuromuscular blocking drugs, and finally spinal anesthesia in combination with obturator nerve block (ONB).[5,6] Various techniques with varied effectiveness have been used for ONB.[2,5,7] The classic method (Labatt's technique) was explained in 1967; now this pubic approach is commonly used for ONB.[7] Recently, Choquet described a simple and reliable new method termed "inguinal approach for ONB", in which the needle is inserted at the mid-point of the femoral arterial pulse and the inner side of the adductor longus muscle at the inguinal crease.[8] It is not clear which of these methods is safer and more effective yet. The present study sought to compare the success rate in terms of the number of puncture attempts, complications, and surgeon and patient satisfaction between the classic and inguinal approaches for ONB.

Patients and Methods

This study was performed on patients scheduled to undergo TURBT at Imam Reza Hospital (Tabriz, Iran) during a 6-month period, as of June 2016. After approval by the local Ethics Committee of Tabriz University of Medical Sciences and registration at the Iranian Registration Clinical Trial Center (IRCT 201608171772N21), informed consent was obtained from all the patients. Seventy patients, aged between 50 and 85 years, with diagnosed cancers of the lateral wall of the bladder were enrolled in this study. The patients were randomly allocated to 2 groups, 35 patients each, using online software (http://www.graphpad.com/quickcalcs/randomize1.cfm). Considering a study power of 0.8 and an α error of 0.05, we calculated the sample size to find a 25% difference in the success rate. The inguinal group patients underwent spinal anesthesia with ONB via the inguinal approach, while the classic group patients underwent spinal anesthesia with ONB via the classic approach. Patients with contraindications to neuraxial block, drug sensitivity, history of drug abuse, psychogenic diseases, inguinal lymphadenopathy, perineal infection or hematoma at the needle insertion site, previous surgery or scars in the region, pre-existing obturator neuropathy, bilateral ONB block due to the site or progress of cancer, and failure of spinal block were excluded from the study. The spinal anesthesia and hemodynamic management were performed by the same anesthesiologist, who was not involved in the ONB procedures. All the ONB procedures were performed by another anesthesiologist, who was not involved in any other patient anesthesia management. All the blocks were performed unilaterally (on the site of cancer). Spinal block was performed using a 25 G Quincke needle at the L3-4 or L4-5 interspace, using 15 mg of 0.5% bupivacaine (Bupivacaine Mylan®). Thereafter, the sensory block level was checked using an alcohol swab or pin-prick test. When the sensory block level reached above T12, ONB was performed. A peripheral nerve stimulator (B Braun, Stimuplex®, Melsungen) and a 10 cm Teflon-insulated needle (21G Stimuplex® A, B. Braun Melsungen) with a current intensity of 0.5 mA at 1 Hz frequency was used for ONB. In the inguinal group, under sterile conditions, the needle was inserted at a 30-degree angle to the skin in cephalad direction at the inguinal crease, 0.5 cm below the midpoint of the line drawn between the femoral artery and the inner margin of the adductor longus muscle. After the identification of the visible adductor longus muscle contraction, 5 mL of 1% lidocaine was injected (for anterior branch block). The needle was subsequently advanced more deeply (0.5–1 cm) and after the identification of the adductor magnus muscle contraction (hip adduction), an additional 5 mL of 1% lidocaine was injected (for posterior branch block). In the classic group, a similar procedure was performed but at 1.5 cm lateral and 1.5 cm inferior to the pubic tubercle. The needle was inserted vertically to the skin. After the needle tip touched the inferior border of the superior pubic ramous, the needle was withdrawn shortly and then directed 45 degrees laterally to enter the obturator foramen. Next, adductor muscle contraction was elicited by nerve stimulation, and 10 mL of 1% lidocaine was injected. One minute after drug injection, the electrical stimulation was repeated at 30-second intervals up to 5 minutes. The time at which the adductor

muscle contraction response disappeared was considered the onset time.

During block and surgery, a coworker, who was blinded to the ONB method, recorded the data on the number of puncture attempts, success rate, time of block onset, and any complication. In addition, after the surgery, patient and surgeon satisfaction was assessed using a 3-step qualitatively scale (complete, relative, and lack). Successful block was defined as the absence of any contraction of the adductor longus muscle with stimulation after performing ONB or during surgery.

Statistical Analysis

The data were analyzed using SPSS, version 19. Normality of data distribution was checked using the Kolmogorov–Smirnov test. The categorical variables such as gender, site of ONB, patient and surgeon satisfaction, and complications were analyzed using the χ^2, Fisher exact, and Mann–Whitney U tests. The continuous variables such as age, height, weight, body mass index (BMI), success rate, number of attempts to block, and time to block onset were analyzed using the *t* test and the Wilcoxon rank sum test. P values below 0.05 were considered statistically significant.

Results

All the patients were eligible for data analysis (figure 1). Table 1 presents the demographic and ONB data. The 2 study groups were similar in terms of the demographic characteristics. There was no difference in the site of cancers between the 2 groups. The success rate of ONB was significantly higher in the inguinal group than in the classic group (97.1% vs. 71.4%; P=0.003). The number of puncture attempts in the classic group was more than that in the inguinal group (3.71±1.10 vs. 1.66±0.68, respectively; P<0.001), with a range of 2 to 7 attempts in the classic group versus 1 to 3 attempts in the inguinal group. The block onset time was significantly shorter in the inguinal group than in the classic group (1.5±0.66 min vs. 2.9±1.18 min; P=0.001). Dissatisfaction of the patient (19 cases vs. 2 cases) and the surgeon (10 cases vs. no case) was higher in the classic group patients (P=0.001). Figure 2 shows the various attempt rates for ONB in the 2 groups. In the inguinal group patients, the most common attempt rate was a single attempt (in 16 [45.7%] cases), whereas all the ONB procedures in the classic group needed more than 1 attempt (in 14 [40%] cases ONB required 3 attempts) (P=0.001). Muscle contraction and hit on the head of the surgeon occurred in only 1 patient from the classic group with unsuccessful ONB (2.9%). Hematoma occurred in only 1 patient in the inguinal group, and no complication occurred in the classic group. Subtle muscle spasms were reported by 2 patients during surgery (from the classic group with unsuccessful ONB).

The patients were classified to 3 subgroups with respect to their BMI. In the normal BMI patients (BMI=20–24.9 kg/m^2), the number of puncture attempts was 1 to 2 times (1.8±0.75 attempts), whereas in the overweight (BMI=25–29.9 kg/m^2) and obese (BMI=30–34.9 kg/m^2) patients, this number was 1 to 6 (2.5±1.24

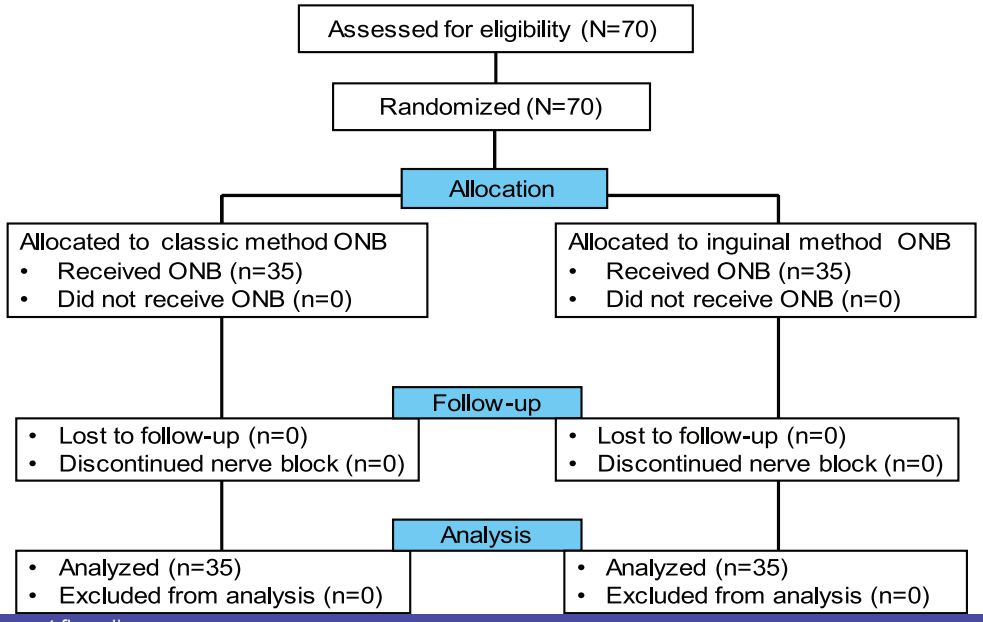

Figure 1: Shows consort flow diagram.

Table 1: Demographic data and characteristics of the obturator nerve block of the 2 groups

Characteristics	Inguinal group (n=35)	Classic group (n=35)	Total (n=70)	P value
Sex				
Male	29	23	52	0.085
Female	6	12	18	
Age (y) mean±SD	63.23±9.63 (51-84)	67.49±11.23 (50-85)	65.36±10.61 (50-85)	0.093
Weight (kg) mean±SD	77.09±6.69 (59-90)	79.20±7.74 (65-100)	78.14±7.26 (59-100)	0.226
Height (cm) mean±SD	165.11±5.10 (154-175)	163.29±18.30 (64-180)	164.20±13.36 (64-180)	0.571
Body mass index (kg/m^2) mean±SD	28.27±2.12 (22.9-31.9)	28.72±2.68 (22.2-33.8)	28.49±2.41 (22.2-33.8)	0.438
Site of obturator nerve block (right/left)	14/21	19/16	33/37	0.338
Success rate	97.1%	71.4%	84.3%	0.003
Surgeon satisfaction N (%)				
Complete	33 (94.3)	3 (8.6)	36 (51.4)	0.001
Relative	2 (5.7)	22 (62.9)	24 (34.3)	
Lack	0 (0)	10 (28.5)	10 (14.3)	
Patient satisfaction N (%)				
Complete	13 (37.1),	2 (5.7),	15 (21.4)	0.001
Relative	29 (57.1)	14 (40)	43 (61.4)	
Lack	2 (5.7)	19 (54.3)	21 (30)	
Number of attempts to block mean±SD	1.66±0.68 (1-3)	3.71±1.10 (2-7)	2.69±1.38 (1-7)	0.001
Time to block onset (min) mean±SD	1.5±0.66 (1-4)	2.9±1.18 (1-5)	2.2±1.19 (1-5)	0.001

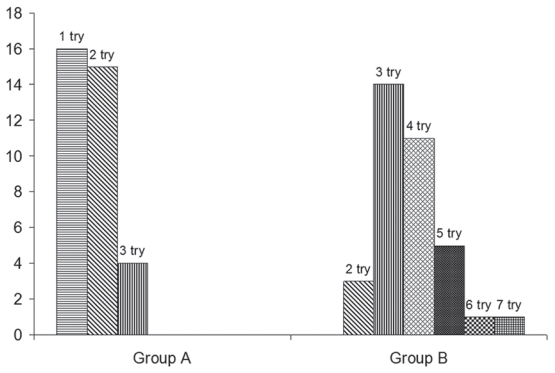

Figure 2: Comparison of the number of attempts for obturator nerve block between the inguinal and classic approaches.

attempts) and 1 to 7 (3.4±1.38 attempts), correspondingly. There was a significant difference between the obese and normal weight patients (P=0.044). The success rate was significantly lower in the obese patients than in the overweight and normal weight patients (P=0.046).

Discussion

The inguinal approach in TURBT was technically easier and enjoyed more appropriate anatomical landmarks than the classic approach. Both methods have, however, been effective for ONB during TURBT. Accordingly, in TURBT along with spinal anesthesia, the inguinal approach for ONB is recommended to prevent complications such as adductor muscle spasm, bleeding, and perforation of the bladder. The success rate of the classic approach for ONB is about 50% to 91% due to difficulties in sensing the pubis tubercle, especially in obese patients.[7] The inguinal approach has a lower complications rate; nonetheless, lack of access to the obturator nerve fibers originating from the hip joint fossa can induce some problems.[7]

In our study, the success rate was defined as the absence of any post-block contraction of the adductor longus muscle (with stimulation by nerve stimulator or during surgery). The success rate was significantly higher in the inguinal approach with a lower number of puncture attempts than in the classic approach. These findings on the success rate are similar to those in a study by Jo et al.,[7] who reported a lower number of puncture attempts in the inguinal ONB than in the classic ONB. In contrast, Moningi et al.[5] reported that the number of puncture attempts showed no significant difference between inguinal and classic ONB procedures.

Prentiss et al.[9] reported 20% incidence of adductor muscle spasm in patients who underwent transurethral resection for large intra-urethral prostatic adenomas and laterally located bladder cancers. In the current study, only 1 (2.9%) patient in the classic group had muscle spasm, and no muscle spasm was detected in the inguinal group. This low level of muscle spam is in line with previous reports, especially that by Moningi et al.,[5] who found just 1 case of adductor spasm with classic ONB. Our findings vis-à-vis adductor muscle spasm support the studies by Jo et al.[7] and Patel et al.[10]

We found that the onset time of the block was more rapid in the inguinal approached group (1.5±0.66 min vs. 2.9±1.18 min). The absence of similar reports in the existing literature precludes a comparison of our results; nevertheless, the reported onset time of ONB is longer (15 and 25 min using 1% mepivacaine and 0.75% ropivacaine, respectively).

Surgeon satisfaction with lack of leg muscle contraction and its interference with the surgical process was higher in the inguinal approach for ONB. Similarly, patient satisfaction was clearly higher in the inguinal group, which was due to the ease of the block performance, few puncture attempts, and subtle muscle spasms during surgery. Apropos bladder perforation and bleeding, it has been reported that involuntary movement of the legs (leg jerking) due to adductor spasm can cause bladder perforation.[3] Bolat et al.[11] reported complete bladder perforation in 2 patients only in the spinal anesthesia group, whereas no perforation was observed in the group that underwent spinal anesthesia with ONB. Cesur et al.[12] compared general anesthesia using succinylcholine with epidural anesthesia completed with ONB and reported a case of difficulty in localizing the nerve, damage to the obturator artery, and arterial bleeding, which was later complicated by hematoma. The type and the frequency of the complications in our study are in line with the studies by Cesur et al.[12] and Jo et al.,[7] but they are in contrast with the study by Moningi et al.,[5] who found that patients in classic ONB had such complications.

In the current study, the number of puncture attempts in the obese patients was clinically higher than that in the normal BMI patients; however, the number of puncture attempts was not significantly different between the overweight and obese patients. In the obese patients, surface landmarks are difficult to either see or palpate and increased adipose tissue may increase the depth to reach various targets. In our study, by comparison with the overweight and normal weight patients, the success rate was significantly low in the obese patients. Nonetheless, some studies have demonstrated that the BMI has no impact on the block success rate.[13,14]

Conclusion

Compared to the classic approach, the inguinal approach for ONB during TURBT appeared to be an easily performable, effective block with a high success rate, rapid onset, and good patient and surgeon satisfaction.

Ethical Consideration

This study was approved by the local Ethics Committee of Tabriz University of Medical Sciences and the Iranian Registry of Clinical Trials. Written informed consent was obtained from all the patients.

Conflict of Interest: None declared.

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