Impact of Obturator Nerve Block on the Short-Term Recurrence of Superficial Bladder Tumors on the Lateral Wall

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Purpose: The aim of this study was to compare the recurrence rates of patients with bladder tumors on the lateral wall undergoing transurethral resection of bladder tumor(TUR-BT) with or without obturator nerve block (ONB) and to investigate the impact of ONB on the effective tumor resection on the lateral bladder wall.

Materials and Methods: All patients who underwent TUR-BT under spinal anesthesia within the three-year study period in the study center were reviewed retrospectively. Among these, 68 patients who had been diagnosed with de novo lateral bladder wall tumor and included in low risk group 1n accord with European Organization for Research and Treatment of Cancer (EORTC) classification, undergone complete resection were enrolled into the study. Group 1 (36 patients who underwent TUR-BT with only spinal anesthesia) and group 2 (32 patients who underwent TUR-BT with spinal anesthesia plus ONB) were evaluated with respect to tumor recurrence rates and disease-free time to recurrence, if any.

Results: Follow-up periods (range, 19 to 41 months for group 1 and 19 to 39 months for group 2) and overall recurrence rates (group 1, 27.8% and group 2, 18.8%) were also found to be similar. Mean time to recurrence was significantly higher in group 2 (15 ± 5.5 months) than in group 1 (7.8 ± 4.5 months) (P = .009)

Conclusion: ONB employed in addition to spinal anesthesia in TUR-BT involving the lateral wall can prolong time to recurrence and increase the chance to lengthen disease-free survival in low-risk superficial bladder tumors.

Keywords: urinary bladder neoplasms; anesthetic; methods; nerve block; obturator nerve; anesthesia.

INTRODUCTION

Transurethral resection for bladder tumors (TUR-BT) is the standard method of diagnosis, staging and treatment. One of the most important problems with the procedure is high rates of tumor recurrence and progression. There are multiple factors affecting recurrence. Of note, residual tumor tissue of the bladder tumor can be detected, even when "complete resection" is performed.[1-3] Resection of tumor tissues completely as necessary, including detrusor muscle has been shown to eliminate residual tumor and prevent short-term recurrence in the TUR-BT procedure.[2-4] Superficial bladder tumors comprise up to 75% to 85% of all bladder tumors at the time of diagnosis and of these, nearly 70% are in the stage of Ta (noninvasive papillary carcinoma).[5]

Rodriguez and colleagues demonstrated that the lateral wall harbors 46.8% of all bladder tumors.[6] Adductor muscle spasm is reported to occur in 55.3% to 100% of resections of lateral wall bladder tumors, with untoward effects on surgery and complications.[6-9] This phenomenon results from proximity of the obturator nerve to the lateral wall of the bladder as it originates from the 2nd and 4th lumbar nerve roots that course towards the adductor muscles. Sudden spasms in the adductor muscles ensue with direct stimulation of the obturator nerve with electrocautery during surgery. To prevent adductor muscle spasm, many methods including administration of muscle relaxants under general anesthesia, obturator nerve block (ONB) in conjunction with spinal anesthesia, incomplete filling of the bladder, diminishing the power of the electrical current, using a 90-degree conventional loop, bipolar plasma kinetic energy, relocating the cautery pad and resection of the tumor by smaller steps have been employed.[10-13]

This study is designed to investigate the impact of ONB employed with spinal anesthesia on the recurrence rates and recurrence times in patients with superficial bladder tumors on the lateral wall in patients undergoing TUR-BT in a mean follow-up period of 32 months.

MATERIALS AND METHODS

Helsinki Declaration principles were followed in this study. Following the approval of the study by the Institutional Review Board, all patients who underwent TUR-BT under spinal anesthesia within the three-year study period (2009-2011) in the study center were reviewed retrospectively. Among these, 68 patients who had been diagnosed with de novo bladder tumor nested in the lateral wall as noted in the surgery reports and included in a low-risk group 1n accord with European Organization for Research and Treatment of Cancer (EORTC) classification (smaller than 3 cm, solitary and documented as Ta G1 papillary urothelial carcinoma by the pathological examination) and who had undergone complete resection were enrolled into the study.[4] Group 1 (36 patients who underwent TUR-BT with only spinal anesthesia) and group 2 (32 patients who underwent TUR-BT with spinal anesthesia plus ONB) were evaluated with respect to tumor recurrence rates and disease-free time to recurrence, if any.

ONB was performed following verification of the level of spinal anesthesia with the patient in lithotomy position. A 21 gauge 100 mm long Stimuplex A (B. Braun Melsungen AG. 34209 Melsungen, Germany) was inserted perpendicularly at the point 2 cm inferior and 2 cm lateral to the pubic tubercle. In accord with the 'traditional approach', the current power of the nerve stimulator was adjusted to 1.5-2 mA and current period as 0.1 ms, the needle was inserted through the skin to the inferior rami of the pubic bone. Then, it was slightly pulled back and redirected anterolaterally, contacting the nerve in a depth of 2 to 4 cm[14] and 10 mL 0.25% levobupivacaine were administered with current at 0.3-0.5 mA when contraction was observed at the adductor muscle groups and after aspiration was negative. Surgery was initiated 10 min following injection. The same anesthesia staff performed the ONBs and the same urologists operated on the patients in both groups and no additional techniques were used to prevent adductor muscle contractions during surgery other than ONB.

All patients underwent complete TUR-BT. A 26 French resectoscope with 30 degree optics were utilized for resection. The whole bulk of the tumor tissue was resected using monopolar cautery while sampling muscle tissue. The patients were administered single-dose intravesical epirubicin (80 mg) in 4 to 6 hours after the operation. Patients suspected to have intraoperative bladder perforation or those with postoperative hematuria did not receive this treatment. All patients were followed up with flexible cystoscopy under local anesthesia every three months for the first year, and then every six months. Demographic and clinical data were obtained and recorded with respect to age, sex, weight, American So-

Table 1. Demographic data (mean ± standard deviation) of study participants.

Variables	Group 1 (n = 36)	Group 2 (n = 32)	*p*
Age (years)	65.8 ± 7.8	67,1 ± 7,8	.477
Weight (kg)	72.8 ± 6	74,8 ± 9,7	.326
Sex Male/Female	34/2	30/2	1.000
ASA I/II/III	4/25/7	2/24/6	.767

Key: ASA, American Society of Anesthesiologists physical status classification.

ciety of Anesthesiologists (ASA) classification, tumor size, follow-up period and recurrence time, if any.

Statistical analysis was performed using the statistical package for the social science (SPSS Inc, Chicago, Illinois, USA) version 18.0. Descriptive data were given as mean ± standard deviation. Student's t test was performed for comparisons of age, weight, tumor size, recurrence time and follow-up period. Recurrence rates and one-year recurrence rates were compared via chi-square, while bladder perforation, sex and ASA scores were compared using Fisher's exact chi-square test. Statistical significance was interpreted when *P* values were below .05.

RESULTS

The differences between the groups regarding age, sex, weight and ASA classification scores were not statistically significant ($P > 0.05$) (Table 1). Mean tumor size was 1.7 ± 0.8 cm in group 1 and 2.0 ± 0.7 cm in group 2 ($P = .227$). There were two bladder perforations in group 1 whereas no perforations in group 2 ($P = .494$). Intravesical chemotherapy was withheld in two patient in group 1 due to suspected bladder perforation, and another one because of hematuria; and in one patient in group 2 for hematuria. No recurrences were detected in these four patients who did not receive intravesical chemotherapy. No side effects related to ONB were reported. Tumor progression was not noted in the follow-up period in any patient recruited in the study. Recurrence rates of the patients in the one-year follow-up were 25% in group 1 and 9.4% in group 2 (Table 2). Follow-up periods (range, 19 to 41 months for group 1 and 19 to 39 months for group 2) and recurrence rates (27.8% in group 1 and 18.8% group 2) were found to be similar in both groups (Table 2). On the other hand, mean recurrence time in group 1 (7.8 ± 4.5 months) was significantly shorter than that in group 2 (15.5 ± 5.5 months) ($P = .009$) (Table 2).

DISCUSSION

Sudden contractions of adductor muscles during TUR-BT situated in the lateral wall result in leg movements which hamper the procedure and result in a myriad of complications.[6-13] Strong contractions of the adductor muscle may lead to partial or complete bladder perforations and resultant extravesical spread of tumor.[8-13] The severity of the potential consequences makes the operator pursue maneuvers such as filling the bladder less than completely, diminishing the power of the electrical current for the electrocautery, or resecting the tumor on thinner slices. These maneuvers may help reduce the rates of complications at the expense of tumor resection performed more often. The present study is originated from the idea to compare the recurrence rates and times in patients undergoing resections of bladder tumors on the lateral wall with or without ONB, thus highlighting the efficacy of ONB on the outcome of the procedure.

In the present study, mean time to tumor recurrence is found to be 7.8 ± 4.5 months in group 1, while 15.5 ± 5.5 in group 2 ($P = .009$). Recurrences were identified in nine patients in group 1 (25%) and three patients in group 2 (9.4%) during one-year follow-up. Disease-free interval in patients who had undergone ONB was significantly longer than others, which is considered to result from the effect of ONB on tumor re-

Table 2. Data regarding the follow up period, number of recurrences and mean time to recurrence (mean ± standard deviation) in both group of patients.

Variables	Group 1 (n = 36)	Group 2 (n = 32)	*p*
Patients with recurrence at 1 year, no. (%)	9 (25)	3 (9.4)	.092
Follow up period (month)	31.6 ± 5.9	31.7 ± 6.8	.930
Patients with recurrence, no. (%)	10 (27.8)	6 (18.8)	.381
Mean time to recurrence (month)	7.8 ± 4.5	15.5 ± 5.5	.009

section on the lateral bladder wall.

Residual tumor tissue following the TUR-BT procedure increase recurrence rates and thus shorten tumor-free interval. Jancke and colleagues pointed out that 26% of patients had residual tumor tissue following complete resection of superficial bladder tumors (Ta/T1) and that these patients suffered from significantly higher recurrence rates when compared to the others.[1]

Tumor recurrence rates noted in the groups in the present study (group 1, 27.8% and group 2, 18.8%) were not found to be significantly different which may be attributed to small sample size and especially small number of patients with recurrence. Future studies with a greater sample size may be expected to reach statistical significance.

Six factors with the greatest impact on the tumor recurrence and progression are; the number and size of tumors, previous recurrence time, TNM classification, presence of carcinoma in situ (CIS) and grade of the tumor.[4] One-year expectancy of recurrence rate in bladder tumors smaller than 3 cm, solitary, newly diagnosed, categorized as Ta, without CIS and low-grade is 10% to 19% and progression rate is 0% to 0.7%.[4] The recurrence rates of tumors which possess the same features in five-year follow-up are between 24% and 36% with a progression rate between 0% and 1.7%.[4] These figures are similar to the rates found in the present study. Both groups of patients received single-dose intravesical epirubicin which was well proven to be effective in low-risk superficial bladder tumors following the TUR-BT procedure.[15,16] The relatively high recurrence rate (25%) compared to expected recurrence rate (10% to 19%) in the one-year follow-up period in the group who were not treated with ONB can be attributed to relative difficulty in complete resection of bladder lateral wall tumors.

Literature search yields many studies indicating the efficiency of ONB to prevent complications of the resection procedure in the bladder tumors on the lateral wall.[6-9,11-13,17] ONB can be performed with various approaches producing success rates in prevention of adductor muscle spasm between 84% and 96%.[17-19] More recent studies cite that introduction of ultrasound in the practice of regional anesthesia is associated with higher success rates in ultrasound-guided ONB procedures (93% to 97.2%).[20-22] Similar to the present study, most reports favored ONB as a safe procedure. However, there are also reports in the literature of complications related to ONB such as serious bleeding and seizures.[23-24] On the contrary, literature lacks data supporting the beneficial effect of ONB on tumor recurrence rates and recurrence time following resection of lateral wall bladder tumors.

The major limitation of this study is the small sample size in both groups. Limited numbers of patients were enrolled into the study in an effort to standardize the factors affecting tumor recurrence rate and recurrence time in both groups. Another limitation is that the patients to be blocked with ONB were chosen by surgeon (patients with a high adductor muscle spasm probability) preoperatively. This situation may have caused a difference in aspect of tumor size (group 1, 1.7 ± 0.8 cm and group 2, 2.0 ± 0.7 cm) between the two groups. Well-designed multi-centered studies will help test the present findings with greater samples. The patients in the present study are still under follow-up in order to investigate

long-term efficacy of ONB on the recurrence rate, recurrence time and progression of lateral wall bladder tumors.

CONCLUSION

ONB performed in addition to spinal anesthesia in TUR-BT procedures for tumors involving the lateral wall can prolong time to recurrence and increase the chance to lengthen the disease-free survival in low-risk superficial bladder tumors.

CONFLICT OF Interest

None declared.

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