

Role of surgeon experience in the outcome of transurethral resection of bladder tumors

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Abstract

Purpose: The purpose of the study is to assess the quality of transurethral resection of bladder tumors (TURBTs) performed by “senior” and “junior” urologists in terms of detrusor muscle (DM) presence at the initial resection and presence of missed and residual tumors at second-look TURBT.

Patients and Methods: An analytic prospective cohort study included 171 patients with stage T1 and Ta bladder cancer who had undergone an initial TURBT. Patients were divided into two groups according to surgeon experience. Group 1 (116 patients) operated on by senior surgeons (consultants and trainees in year 5 or 6) and Group 2 (55 patients) operated on by junior surgeons (trainees below year 5). All patients underwent second-look TURBT (by a senior urologist) within 2–6 weeks after the initial resection. The outcome of the initial and re-TURBT represented with regard to the surgeon experience.

Results: There is a statistically significant difference between senior and junior surgeons regarding the presence or absence of DM in the initial resection ($P = 0.001$). A significant relation between the presence of residual tumors in re thermodynamic uncertainty relation (TUR) in relation to the initial operator was found ($P = 0.03$). Re-TURBT of patients in Group 1 (initially operated on by experienced surgeons) revealed that 57.7% had tumor-free resection while 36.2% had residual tumors, 5.2% had missed lesion and only 0.9% had concurrent residual and missed tumors. In contrast, from Group 2 (55 patients operated by junior surgeons) 47.3% had residual tumor, 21.8% had missed lesions, and 9.1% had concurrent residual and missed tumors in re-TUR.

Conclusions: Nonmuscle invasive bladder cancer treated with TURBT should be managed as any other major oncologic procedure. TURBT should be performed by an experienced surgeon or with very close supervision when done by training urologist.

Keywords: Quality, Surgeon experience, transurethral resection of bladder tumors

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INTRODUCTION

Bladder cancer is the most common cancer of the genitourinary tract in Egypt.^[1] Worldwide, it is ranked as the fourth most common male malignancy.^[2] Approximately 75%–85% of patients with bladder cancer present with

nonmuscle invasive bladder cancer (NMIBC).^[3] Successful management of NMIBC depends mainly on complete removal of all visible and invasive component of the tumor as well as adequate pathological evaluation of the resected specimen to provide the strategy of further treatment and

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follow-up schedules as well as the prognosis. Transurethral resection of bladder tumor (TURBT) is the most essential surgical procedure needed for diagnosis, staging, and treatment of NMIBC.^[4] Although TURBT is a frequently performed operation familiar to urologists, it is not an easy procedure, and it had many technical difficulties. Tumors may be overlooked if extensive or involve sometimes difficult to reach regions of the bladder, such as dome, anterior wall, or bladder neck. As the resection proceeds, vision often becomes obscured owing to mucosal edema, bladder spasms, and bleeding, making it increasingly difficult to differentiate normal from tumor-bearing mucosa and to obtain clear negative surgical margins.^[5] The rate of residual tumor detected by a second thermodynamic uncertainty relation (TUR) varies between 27% and 78%.^[6] Early recurrence rates vary among different institutions ranged from 0% to 46%, owing to the quality of TUR performed by different surgeons.^[7] Our aim in this study is to evaluate the role of surgeon experience in relation to perform a complete high-quality TURBT.

PATIENTS AND METHODS

From January 2011 to March 2013, 171 patients underwent initial resection followed by a second-look TUR within 2–6 weeks. All patients included in this study had a complete initial resection as reported by the operating surgeon with a pathological diagnosis of NMIBC; 35 patients that have no muscle received in the initial pathology scheduled for re-biopsy. At the initial TURBT, the procedure was performed by both senior staff and residents without any special assignment.

Resection was performed by the use of white-light cystoscopy and standard resection equipment using standard resection technique (all visible tumors were completely resected, with a deep muscular sample taken from the tumor base as well as the tumor margins. All samples were taken as separate specimens and sent for histopathologic assessment. Tumors were staged according to the tumor-node-metastasis classification and graded according to the new World Health Organization = International Society of Urologic Pathology classification). Patients with a muscle-invasive disease, any pathological subtype rather than transitional cell carcinoma, and those who were known to have incomplete initial resection or biopsy only were excluded from the study.

The mean age was 59 years; complete preoperative clinical evaluation, including history and full physical examination; laboratory and radiologic investigations were performed for all patients.

Patients were categorized into two groups regarding the experience of the surgeon performing the initial TURBT; Group 1 was operated by senior surgeons (consultants and trainees in year 5 or 6) and Group 2: Junior group (trainees below year 5). Re-TURBTs were performed by senior surgeons for all patients; the bladder was reassessed for the detection of any residual tumors or missed lesions. Resection from the base of the previously resected tumor was performed for restaging.

The outcomes of the initial and re-TURBT were reported immediately after each procedure on a cystoscopy sheet by the operating surgeon, including size, number, appearance, and location of the tumor as well as the surgeon name and position denoting either he was a senior or junior staff. The outcomes of the initial and re-TURBT were represented with regard to the surgeon's experience.

Statistical analysis

The data were analyzed using Statistical Package for Social Sciences, version 16 (SPSS, Chicago, IL, USA). Analytic statistics were obtained using the Chi-square test, the Fisher's exact test, and the differences were significant if $P < 0.05$. Multivariate logistic regression analysis (binary regression) was used to assess the risk factors of the presence of detrusor muscle (DM) at the initial resection and presence of missed and residual tumors at second-look TURBT.

RESULTS

Among 116 patients operated upon by senior surgeons, 13 patients (11%) had no muscle received in the initial resection compared to 22 (40%) out of 55 patients performed by junior surgeons. There is a statistically significant difference between senior and junior surgeons regarding the presence or absence of DM in the initial resection ($P = 0.001$) [Table 1].

The initial TUR shows that among 171 patients (performed by both senior and junior surgeons), 112 patients (65.5%) had solitary tumor, while 59 patients (34.5%) had multiple ones. Tumor size exceeds 3 cm in 61 patients (35.7%), while in 110 patients (64.3%) it was <3 cm in diameter.

Table 1: The presence or absence of detrusor muscle at the initial transurethral resection in relation to surgeon's experience

Surgeon	Detrusor muscle at initial TUR		Total	P
	Received, n (%)	Not received, n (%)		
Senior	103 (88.8)	13 (11.2)	116 (100)	<0.001*
Junior	33 (60)	22 (40)	55 (100)	
Total	136 (79.5)	35 (20.5)	171 (100)	

*Significance level $P \leq 0.05$. TUR: Transurethral resection

One hundred and forty-nine patients (87.1%) had papillary tumors, while 22 patients (12.9%) had nodular tumors. The surrounding mucosa showed flat lesions in 5 patients. Table 2 describes the patient's characteristics cystoscopic findings and histopathological data during the first TURBT.

The second TUR was negative in 79 (46.2%) patients. Residual tumors were found in the same site of the previous resection in 68 (39.8%) patients, while missed lesions were found in another site far from the previous resection in 18 (10.5%) patients. Six patients (3.5%) had concurrent residual and missed lesions in their second TUR. Table 3 describes the rate of residual tumors and missed lesions in the second TUR among the studied patients.

The initial TUR of 116 patients was performed by senior surgeons (Group 1), of those patients, 67 (57.7%) had free tumor resection in the second TUR while 42 (36.2%) had residual tumors and 6 patients (5.2%) had missed lesion. Comparing the 55 patients operated on by junior surgeons,

26 patients (47.3%) had residual tumor and 12 (21.8%) had missed lesions in re TUR, Table 3 shows the strong relation between the experience of the initial operator and presence of residual tumors or missed lesions at the second TURBT. There is a statistically significant difference between the two groups regarding the tumor-free state reflecting the absence of residual, missed, and concurrent residual and missed lesions ($P < 0.05$).

Logistic regression multivariate analysis revealed that senior surgeons were more likely to resect DM (odds ratio = 4.9, 95%, confidence interval = 2.3–10.7, $P < 0.001$). Parameters tested included tumor size, number, stage, and grade from Table 2.

DISCUSSION

TURBT is the first and main step to manage patients with NMIBC. Complete and correct TURBT in combination with intravesical chemotherapy or immune-therapy when indicated is essential to achieve a good prognosis;^[6-8] however, complete removal of all tumors during the initial

Table 2: Patients and tumour characteristics

Patients characteristics, cystoscopic findings and histopathological data of tumors	Patients number and percentage (n=171; 100%)	Group 1 (n=116)	Group 2 (n=55)
Mean age (years) (range)	59.8 (39-75)	60.1 (40-75)	58 (39-71)
Sex, n (%)			
Male	119 (69.6)	80 (69)	39 (70.9)
Female	52 (30.4)	36 (31)	16 (29.1)
Number, n (%)			
Single	112 (65.5)	78 (67.2)	34 (61.8)
Multiple	59 (34.5)	38 (32.8)	21 (38.2)
Size (cm), n (%)			
<3	110 (64.3)	76 (65.5)	34 (61.8)
>3	61 (35.7)	40 (34.5)	21 (38.2)
Appearance, n (%)			
Papillary	149 (87.1)	101 (87)	48 (87.2)
Nodular	22 (12.9)	15 (13)	7 (12.8)
Stage, n (%)			
Ta	51 (29.8)	35 (30.2)	16 (29.1)
T1	120 (70.2)	81 (69.8)	39 (70.9)
Grade, n (%)			
Low grade	102 (59.6)	68 (58.6)	34 (61.8)
High grade	69 (40.4)	48 (41.4)	21 (38.2)
Associated CIS, n (%)			
Positive	5 (2.9)	4 (3.4)	1 (1.8)
Negative	166 (97.1)	112 (96.6)	54 (98.2)

CIS: Carcinoma *in situ*

Table 3: Rate of residual and missed tumors in relation to the initial operator

Second TUR findings	Rate of residual tumors and missed lesions in Re-TUR			P
	Both groups, n (%)	Senior, n (%)	Junior, n (%)	
Residual tumors	68 (39.8)	42 (36.2)	26 (47.3)	0.03*
Missed tumors	18 (10.5)	6 (5.2)	12 (21.8)	
Concurrent residual and missed	6 (3.5)	1 (0.9)	5 (9.1)	
Tumor free	79 (46.2)	67 (57.7)	12 (21.8)	
Total	171 (100)	116 (100)	55 (100)	

Residual tumor: Tumor in the same site of first resection, Missed lesion: Tumor in another site away from first resection, *Significant $P \leq 0.05$. TUR: Transurethral resection

resection may not be achieved. Many studies reported a significant rate of residual cancer (33%–53%) through the second TUR; this inadequate tumor clearance result in false early recurrence as well as inaccurate staging.^[9-13] The questions which are raised here is why this high rate of residual cancer after the initial resection? The answer of this question could be referred to tumor-related factors (stage, grade, size, site, multiplicity, and associated CIS)^[14-17] and technical difficulties of the procedure that may presented as poor cystoscopic view due to bleeding, perforation, mucosal edema, and bladder spasm with the sheared area of coagulation which make it difficult to identify tumor-bearing mucosa; all this beside resection of tumors in difficult to reach sites.^[4] The work of the European Organization for Research and Treatment of Cancer (EORTC) study highlighted for the first time that surgeon factor contributes to early recurrence, even in centers contributing to clinical trials.^[6] In our study, we aimed to evaluate the role of the surgeon factor in the outcome of the initial TURBT.

Although the primary goal of resecting the tumor base is to obtain DM and TURBT considered subjectively complete when this achieved, the specimens do not always contain DM. In our study, a part of 136 patients represent DM in their initial pathology; we have 35 patients that have no muscle received in their specimens. The absence of DM in the resection specimens in the published series ranges from 30% to 50% and this usually associated with high risk of leaving residual disease behind and 40% risk of upstaging.^[3,18-21]

We observed that from those 35 patients whom had no muscle received in the initial specimens, 22 out of 55 (40%) of patients were operated on by junior surgeon and 13 patients out of 116 (11.2%) were operated on by seniors and the difference was statistically significant and reflects that the presence of DM in the resected specimen is more likely when patients operated on by senior surgeon. Our results coincide with Mariappan *et al.*, in their prospective study which aimed to determine if (a) DM can be a surrogate marker of the “quality” of TURBT and (b) the presence of detrusor is dependent on surgeon’s experience? They reported a total of 348 patients, seniors perform 66.1% of the resections, DM was present in 72.6% of them, and it was absent in 27.2%; however, juniors perform 33.9% of patients, DM was present 56.8% and absent in 43.2%; logistic regression multivariate analysis revealed that surgery carried out by senior surgeons were associated with the presence of detrusor. They concluded that the presence of DM in the TURBT specimen was more likely when surgery was performed by senior surgeons and

predicted a lower rate of recurrence (residual tumors) in the first follow-up cystoscopy.^[22] Another study conducted by Jesuraj *et al.* aimed to prove that completeness of initial TURBT depend on the seniority of the surgeon; they reported a significant difference in the ability to resect DM between senior and junior surgeons, DM was present in 67.3% when TURBT was performed by seniors compared to 45.8% of specimen when performed by juniors. They concluded that surgeon experience and technical ability affect both the ability to stage accurately as well as the clinical outcome of the procedure.^[23] Brausi *et al.* stressed on the surgeon’s ability to resect DM in relation to the operator experience and more importantly they showed that after a training program, there was an increase in the overall ability to resect DM (from 50% to 80%) and reduce the overall perforation rate.^[24]

Despite the presence of DM in the initial resection, a second look TURBT is recommended, especially in patients with stage T1 high-grade tumors. In our study, the results of the second TURBT of the 171 patients, residual tumors and missed lesions were reported in 39.8% and 10.5%, respectively, and only 3.5% had concurrent residual and missed. When we correlate this rate of residual malignant disease with regard to the initial operator, we found a significant correlation between the initial operator and presence or absence of residual tumors in the second TURBT ($P = 0.03$). Tumor-free resection was reported in 57.7% of 116 patients operated by seniors compared to 21.8% of 55 patients operated by juniors. A substantial variation in early recurrence rates among different institutions was reported. The analysis of seven randomized trials revealed that the frequency of 3-month recurrences ranged from 0% to 46%, owing to the quality of TUR performed by different surgeons and so they stressed the impact of surgeon on the rate of residual tumors in re-TUR.^[6] Brausi *et al.* also reported recurrence-free rate at the first follow-up cystoscopy to be 8% and 28% when resections were carried out by staff members and trainees, respectively.^[24] The rate of residual tumors in the re-TUR was lower in studies where the initial TUR was performed by senior surgeons.^[12,17]

Ali *et al.* evaluated second-look transurethral resection in restaging of patients with nonmuscle invasive bladder cancer in an analytic prospective cohort study included 91 patients with stage T (1) and T (a) bladder cancer. Second-look TURBT had changed treatment strategy in 22 (24.2%) of patients; hence, the importance of performing the initial resection with the highest quality urology surgeons should be emphasized.^[25]

Zurkirchen *et al.* reported that a single TUR may not remove all tumors, particularly invasive cancer, even when performed by experienced urologists. They found that the rate of residual tumor at the second TUR was 37% for beginners versus 26% for experienced surgeons.^[26]

Mariappan *et al.*, on their study of 473 NMIBC specimen concluded that DM status at the first apparently complete, TURBT, and surgeon's experience independently predict the quality of TURBT. They also stated that documented complete resection by experienced surgeons with DM presence (good quality white-light TURBT) should be considered a benchmark for white-light TURBT in NMIBC.^[27]

Successful management of bladder tumors is predicated on careful history taking, physical assessment, meticulous endoscopic assessment, and TURBTs.^[28]

We stressed on that TURBT is not an easy procedure, and we are still in need to teach our self-many tricks to overcome its technical difficulties. We have to train our residents to perform TURBT but with very close supervision and by the dedication of teaching courses for such procedure.

CONCLUSIONS

Complete good quality TURBT to treat patients with NMIBC should be managed as a major oncologic procedure. TURBT should be performed by an experienced surgeon or with very close supervision when done by training urologist. We are in need to standardize surgical techniques for this apparently simple procedure.

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Conflicts of interest

There are no conflicts of interest.

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