



To achieve the best performance of transurethral resection of bladder tumor: implication of surgical checklist

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Urothelial carcinoma at bladder is the 9th most common malignancy worldwide (1). It is the second most common malignancy in the urologic tract (2). According to GLOBOCAN data, 165,000 bladder cancer death occurred in 2012 worldwide (3). The clinical behavior of bladder urothelial carcinoma is quite different depending on the presence of muscle layer invasion. The involvement of muscular layer in transurethral resection of bladder tumor (TURBT) specimen is one of the most important factors for adequate diagnosis and management. Non-muscle invasive bladder cancer (NMIBC) can be easily treated by TURBT. However, up-to 80% and 45% of patients experience recurrence and progression, respectively, with long-term follow up (4,5). For this reason, current guidelines recommend repeated TURBT with regular follow-up by cystoscopy and trans-urethral resection or drug instillation for intra-vesical recurrence (6-8).

Frequent cystoscopy and TURBT increase health care cost and decrease patient's quality of life (QOL). EAU, NCCN, and AUA guidelines for surveillance protocol recommend cystoscopy at least 5 years of follow-up with 3-month interval in the first year for low-risk disease with more frequent surveillance for higher risk bladder cancers (7-9). About 60% of lifetime medical cost of bladder cancer patients is spent on surveillance (10). This expenditure makes bladder cancer one of the most expensive malignancies to treat (11). Patient's quality of life is another issue of NMIBC patient surveillance. A cross-sectional

study using SEER (Surveillance, Epidemiology, and End Results) database has shown that the detection of bladder cancer itself decreases both mental and physical subset of patient reported QOL (12). Explicably, muscle invasive bladder cancer (MIBC) patients report much lower QOL than NMIBC patients. Disease recurrence and progression also worsen their QOL.

Just performing TURBT is simple. However, performing qualified TURBT is not that easy. Recent evidences support that surgical quality of TURBT can affect recurrence rate of bladder urothelial carcinoma (13). Brausi *et al.* (14) have reported inter-institutional differences in intravesical recurrence after TURBT of Ta, T1 bladder tumor using combined seven EORTC studies. Percentage of patients who needed intravesical instillation because of recurred cancer in the first follow-up cystoscopy was 0–15.4% in single tumor and 7.4–45.8% in multiple tumors. Mariappan *et al.* (15) have described surgical experience associated with positivity in detrusor muscle on first TURBT with early recurrence. Rolevich *et al.* (16) have reported that recurrence rate after TURBT is significantly different among five high volume surgeons in a single institution. The 5-year recurrence free rate was 44.2–62.9%. These differences were statistically significant. These findings supported that the quality of TURBT can be affected by surgeon's experience and style of surgery.

There are various quality improvement strategies for NMIBC management. Repeated TURBT is still on debate.

However, most methods for improving quality of TURBT are acceptable and endorsed by the EAU guideline (7). Evidence of repeated TURBT is based on incompleteness of initial TURBT and survival gain of repeated TURBT. Dutta *et al.* (17) have reported that about 40% of patients undergoing TURBT have risk of under-staging which is detected in radical cystectomy specimen. Badalato *et al.* have founded the presence of muscularis propria in TURBT is a surrogate marker of pathologic up-staging in high risk urothelial carcinoma (18) which is a marker of TURBT surgical quality (15). However, another evidence from multi-center cohort data has suggested that repeated TURBT is unnecessary because it has no clinical benefit if the muscle layer is present in the specimen of primary TUR (19). Because repeated TURBT is relatively safe (20), it is recommended in selective patients who are at high risk of bladder cancer or fail to obtain muscle layer in initial TURBT.

Surgical checklist is one of the easiest ways to improve performance quality of surgical procedures. WHO surgical checklist announced in 2009 by WHO was developed to reduce communication error by the part of Safe Surgery Saves Lives campaign (21). After WHO surgical checklist is published, it is accepted by more than 4,000 institutions world-wide (22). Although WHO checklist is developed to reduce communication error for blocking intraoperative complications (23), recent studies have shown that WHO surgical checklist itself has benefits for reducing postoperative complication of surgery (24).

Using surgical checklist in urologic field has also been studied for TURBT. Anderson *et al.* (13) have reported 10-item surgical checklist during TURBT shows possibility of improving clinical outcome. In their study, the completeness of resection was significantly ($P < 0.00001$) increased after implication of surgical checklist, although there was no significant ($P = 0.8$) change in containing the detrusor muscle in TURBT specimen. The surgeon who reported more checklist items tended to have higher chance of obtaining muscle-containing specimen in TURBT, although the difference was not statistically significant ($P = 0.062$). Their study successfully demonstrated the increase of awareness after adaptation of surgical checklist. However, the correlation of recurrence with surgical checklist was unclear.

Suarez-Ibarrola *et al.* (25) have recently published a study to reveal the association between surgical checklist and recurrence free survival of TURBT. The authors applied an eight-item surgical checklist for TURBT in two tertiary referral centers. All items of the checklist were evidence-based and guidelines recommended. These

checklist items were “Tumor status”, “Positive pre-TUR bimanual palpation”, “Macroscopic appearance”, “Tumor size”, “Number of tumors”, “Location, n (%)”, “TUR macroscopically complete” and “Positive post-TUR bimanual palpation”. The major hypothesis of their study was that if pre-operative surgical checklist was carefully performed through cystoscopy by surgeons, it would improve the surgical quality. For this reason, the authors predicted that “Number of tumors” and “Location, n (%)” items were the most important factors that would affect the recurrence free survival. The authors retrospectively reviewed 547 patients, including 266 (49%) of checklist implicated patients, with as recurrence free survival as target primary end-point. The performed surgical checklist was an independent factor associated with recurrence free survival by cox-proportional hazard regression analysis ($P = 0.02$). The “Number of tumors” item in surgical checklist was also an independent prognostic factor ($P = 0.08$) as expected by the authors. However, the presence of detrusor muscle, a surrogate marker of surgical quality of TURBT, was not significantly different after implication of the surgical checklist. The authors explained that this result was because, although the eight-item surgical checklist resulted in careful cystoscopy, it did not guarantee qualified resection. Thus, careful cystoscopy before TURBT has benefit for identifying small tumor that can be easily neglectable and associated with intra-vesical recurrence of non-muscle invasive bladder cancer.

Suarez-Ibarrola *et al.* (25) have described that the surgical checklist is more user friendly and easily applicable than the 10-item checklist previously reported by Anderson *et al.* (13). They have successfully demonstrated the impact of careful cystoscopic inspection before TURBT on recurrence free survival. However, the clinical goal of TURBT in NMIBC is not only reducing recurrence free survival, but also reducing progression to MIBC. The detrusor muscle containment of TURBT specimen is one of the most important markers to justify the quality of TURBT. Thus, this surgical checklist needs more improvement.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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