

ORIGINAL ARTICLE

Consensus-Based Development of a Surgical Checklist for Transurethral Resection of Bladder Tumor: An Initiative of the Japanese Society of Urologic Oncology

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ABSTRACT

Objective: This study aimed to develop a nationwide, consensus-based surgical checklist to standardize transurethral resection of bladder tumor procedures and documentation.

Methods: In 2025, the Japanese Society of Urologic Oncology convened a working group of 20 bladder cancer specialist urologists to develop a national surgical checklist for transurethral resection of bladder tumors. A 12-member steering committee reviewed available evidence and proposed 30 candidate items. Using a modified Delphi approach, all members rated each item online, with consensus predefined as $\geq 75\%$ agreement. Iterative revisions incorporating public comments and external expert input produced the final checklist.

Results: The final checklist comprised 22 items across four sections: (i) preoperative patient and tumor information (recurrence status; upper tract urothelial carcinoma; urine cytology; clinical Tumor–Node–Metastasis staging; performance status; factors affecting surgery/anesthesia); (ii) surgical and anesthetic planning (surgical intent; resection technique; adjunctive imaging modality; additional biopsies; anesthesia method; obturator reflex prophylaxis); (iii) intraoperative tumor and resection information (tumor number; index tumor morphology; index tumor size; findings suggestive of carcinoma in situ; extent of tumor resection; detrusor muscle visible; muscle invasion suspected); and (iv) complications and adjuvant therapy (urethral stricture; intraoperative complications; immediate single instillation). An additional section provides two bladder diagrams: a male/general-use version with lower urinary tract annotations and a female-specific version, both designed for mapping tumor location, characteristics, and operative findings.

Conclusions: This checklist provides a practical framework to standardize transurethral resection of bladder tumor practice and documentation and support safe, high-quality care, warranting prospective evaluation of feasibility, adherence, and quality indicators/outcomes.

1 | Introduction

Bladder cancer (BC) is the most common malignancy of the urinary tract and the ninth most frequently diagnosed cancer worldwide, with an estimated 613 791 new cases diagnosed globally in 2022 [1]. Approximately 75% of newly diagnosed cases present as non-muscle-invasive bladder cancer (NMIBC) [2]. In NMIBC, transurethral resection of bladder tumor (TURBT) is the first-line procedure for diagnosis and initial management. It provides tissue for pathological assessment and captures key intraoperative clinical tumor characteristics (tumor location, number, diameter, appearance, and the presence of concurrent carcinoma in situ [CIS]), thereby enabling clinical risk stratification and guiding subsequent decisions regarding intravesical therapy, repeat resection, and surveillance [3, 4]. Given the breadth of clinical information generated during TURBT, variability in procedural documentation may compromise staging accuracy, risk-adapted treatment, and oncologic outcomes.

High-quality resection is critical for accurate staging and risk-adapted management of NMIBC. In clinical practice, the presence of detrusor muscle in the resection specimen is widely accepted as a surrogate marker of TURBT quality [4]. Inadequate detrusor muscle sampling may result in residual disease, understaging, and early intravesical recurrence. Mariappan et al. reported that intravesical recurrence rates after TURBT increased from 34.9% to 81.3% when the detrusor muscle was absent from the resection specimen [5]. However, a systematic review demonstrated wide variability in detrusor muscle sampling rates in TURBT (30%–100%) across institutions [6]. Collectively, these findings highlight the need for a standardized, systematic approach to promote complete resection with adequate detrusor muscle sampling and to reduce variability in TURBT quality.

Recently, surgical checklists have gained prominence as practical tools to reduce omitted steps, standardize documentation, and support team communication. The World Health Organization recommends the WHO Surgical Safety Checklist to reinforce essential safety practices, and its implementation has been associated with reduced surgical complications and mortality across diverse settings [7]. In TURBT, procedure-specific surgical checklists have been shown to improve documentation and surrogate quality indicators such as detrusor muscle sampling, with some studies suggesting reduced intravesical recurrence after implementation [8–10]. Nevertheless, existing checklists have focused predominantly on intraoperative documentation and may not fully address the diverse patient- and tumor-specific challenges that require meticulous preoperative preparation and perioperative risk mitigation. Accordingly, there is a growing need for a TURBT-specific surgical checklist designed for routine practice that integrates perioperative safety considerations while promoting high-quality resection and standardized documentation.

To address this unmet need, we developed a TURBT-specific surgical checklist for routine clinical use. Based on available

evidence and guideline recommendations, we iteratively refined checklist items spanning preoperative planning, intraoperative key steps, documentation, and immediate postoperative management. In this consensus statement, we describe the development process and present the finalized checklist, aiming to support safer, more consistent, and higher-quality TURBT across diverse clinical settings.

2 | Methods

In August 2025, a Japanese working group comprising 20 urologists specializing in cancer care, with expertise in bladder cancer management, was convened to develop a national TURBT surgical checklist. The members had a mean age of 50.0 years (range, 37–64 years); all were affiliated with university hospitals, and their institutions were distributed across eastern ($n=7$), central ($n=6$), and western ($n=7$) Japan. A 12-member steering committee drafted candidate items through iterative discussion informed by clinical practice guidelines and published TURBT checklist studies, refining items for feasibility and relevance to routine clinical practice in Japan, yielding a 30-item draft checklist.

In October 2025, the draft was circulated to all working-group members and evaluated using a single-round online voting system following a modified Delphi approach. For each candidate item, members voted using three response options (Agree, Disagree, or Abstain). The agreement rate was calculated as the proportion of all 20 working-group members selecting “Agree” (number of Agree votes divided by 20), and $\geq 75\%$ agreement was prespecified as indicating broad consensus. A single voting round was prespecified because the candidate checklist had already been iteratively refined by the steering committee, and the working-group vote aimed to confirm broad acceptability and identify wording or structural refinements. Final item retention was based on both the $\geq 75\%$ agreement threshold and written comments regarding redundancy, conceptual overlap, feasibility, and documentation burden. No second voting round was conducted because all retained items met the prespecified consensus threshold.

In November 2025, the revised draft underwent public comment via the URO-ONCOLOGY HUB (<https://w3.urohub.jp/>), a web-based platform operated by the Japanese Society of Urologic Oncology (JSUO), as well as external review by bladder cancer experts not involved in the working group. Feedback was reviewed during web-based meetings and via email, and the checklist was revised accordingly. The final version was approved by all working-group members in December 2025.

3 | Results

Of the 30 candidate items, 22 were retained in the provisional checklist. The eight excluded items were a history of bladder

cancer treatment within the previous 3 months, discussion of the resection strategy, complete hemostasis, image documentation of the resection base, urethral injury, bladder perforation, ureteral stent placement, and urethral catheter balloon volume (Table S1). These items were excluded because they were encompassed by broader retained domains, represented supplementary narrative information, were not considered universally central to TURBT quality, or would have increased documentation burden. The two items that exactly met the prespecified threshold, surgical intent and detrusor muscle visible, were specifically reviewed and retained for their clinical importance in clarifying operative objectives and assessing resection quality, respectively.

Public comment and external expert review led to further refinements focusing on terminology, item definitions, and practical usability. Specifically, the draft was revised by correcting the clinical Tumor–Node–Metastasis (cTNM) classification, clarifying that the asterisk indicates items permitting multiple selections, refining the biopsy and perioperative risk items, and clarifying the role of the bladder diagram in documenting tumor location and morphology. The final national TURBT surgical checklist, shown in Table 1, comprises four core perioperative sections and an additional section for standardized diagram-based documentation with male/general-use and female-specific diagrams.

3.1 | Preoperative Patient and Tumor Information

The first core perioperative section addresses preoperative patient and tumor information. These data establish the clinical context for TURBT, help define surgical goals, and guide selection of the operative approach and anesthesia. Accordingly, all six items in this section should be completed before surgery.

First, confirming recurrence status is essential, as prior recurrence is among the strongest predictors of subsequent recurrence and progression [11], directly informing risk-adapted adjuvant therapy and surveillance [3, 4]. In recurrent tumors, attention should also be paid to prior treatments and the interval from the last treatment to recurrence. In addition, prior or synchronous upper tract urothelial carcinoma (UTUC) is associated with bladder tumor occurrence and recurrence and alters diagnostic work-up and surveillance planning [12]. Urine cytology is a key adjunct to cystoscopy in the TURBT pathway because it aids in the detection of high-grade urothelial carcinoma and CIS [13]. Positive cytology in the absence of visible tumors warrants further evaluation for UTUC, occult bladder CIS, and prostatic urethral tumors. Furthermore, confirmation of the cTNM classification before TURBT helps ensure complete preoperative assessment, clarifies surgical intent, and facilitates timely postoperative triage when muscle-invasive or advanced disease is clinically suspected. To improve safety, documentation of perioperative modifiers (e.g., urinary tract infection (UTI), pyuria/bacteriuria, and antiplatelet/anticoagulant therapy) together with Eastern Cooperative Oncology Group performance status (ECOG-PS) is essential for anesthesia planning and risk mitigation in TURBT. Pyuria/bacteriuria may predict postoperative UTI [14], and documentation of antiplatelet/anticoagulant agents helps balance bleeding and thromboembolic risks [15].

3.2 | Surgical and Anesthetic Planning

The second core perioperative section focuses on surgical and anesthetic planning. Because preoperative determination of the operative approach and anesthesia strategy is essential for high-quality TURBT, smooth procedural execution, and patient safety, all six items in this section should be decided before surgery.

Defining surgical intent—first TURBT, second TURB, maximal/visibly complete TURBT [16], palliative hemostatic TURBT, or diagnostic tissue sampling—is essential, as expected endpoints differ (complete macroscopic resection and accurate staging vs. completion/restaging vs. symptom control). The resection technique (conventional/en bloc) and adjunctive imaging modality (none/photodynamic diagnosis (PDD)/narrow-band imaging) should be determined preoperatively to ensure that the intended surgical goals can be achieved [17, 18]. Collectively, these checklist items encourage the adoption of evolving surgical strategies and ensure preparation for any additional steps, equipment, or resources required. In addition, considering additional biopsies is important when occult CIS or prostatic urethral involvement is suspected despite normal-appearing mucosa [19]. When evaluation of the prostatic urethra is indicated (bladder neck tumor, positive urine cytology without a visible bladder lesion, or suspicious prostatic urethral mucosa), prostatic urethral biopsy should be performed using a resection loop from the precollicular area (between the 5 and 7 o'clock positions adjacent to the verumontanum) [4].

Documenting the anesthesia method and strategy for obturator reflex prophylaxis is essential, as obturator nerve stimulation during TURBT—particularly for posterolateral or lateral wall tumors—can trigger an “obturator jerk,” increasing the risk of bladder perforation and compromising resection quality. A systematic review and meta-analysis reported that spinal anesthesia combined with an obturator nerve block (ONB) significantly reduced the incidence of obturator reflex and bladder perforation compared with spinal anesthesia alone, supporting routine documentation of ONB use [20]. A randomized controlled trial comparing ONB with neuromuscular blockade found both approaches safe and effective in preventing adductor spasm [21], underscoring the importance of recording the prophylactic method for outcome interpretation and quality auditing.

3.3 | Intraoperative Tumor and Resection Information

The third core perioperative section addresses intraoperative findings and resection quality. This section is intended to improve adherence to essential procedural steps and promote standardized documentation during TURBT [9, 22–25].

Recording tumor number, index tumor size, and cystoscopic suspicion of CIS is essential for standardized risk stratification and planning subsequent treatment and surveillance [3, 4], as these variables are core predictors in the European Organization for Research and Treatment of Cancer (EORTC)

TABLE 1 | Final 22-item surgical checklist for TURBT.

No	Items	Classification
(I) Preoperative patient and tumor information		
1	Recurrence status	Primary/Recurrent
2	UTUC	None/History of UTUC/Concomitant UTUC
3	Urine cytology	Not performed/Performed (result: _____)
4	cTNM	T: _____/ N: _____/ M: _____
5	ECOG-PS	0/1/2/3/4
6	Factors affecting surgery/anesthesia ^a	UTI present/Antiplatelet or anticoagulant therapy/Others
(II) Preoperative surgical and anesthetic planning		
7	Surgical intent	1st TURBT/2nd TURB/Maximal TURBT Hemostasis (palliation)/Tissue sampling (diagnostic)
8	Resection technique ^a	Conventional/En bloc/Other
9	Adjunctive imaging modality ^a	None/PDD/NBI/Other
10	Additional biopsies ^a	None/Random bladder/Prostatic urethra
11	Anesthesia method ^a	General/Spinal/Epidural
12	Obturator reflex prophylaxis ^a	None/Nerve block (right/left)/ Neuromuscular blockade
(III) Intraoperative tumor and resection information		
13	Tumor number	Solitary/Multiple/Not assessable
14	Index tumor morphology ^a	Papillary/Nodular/Pedunculated/ Sessile/Flat/Ulcerative
15	Index tumor size	< 30 mm/≥ 30 mm/Not assessable
16	Findings suggestive of CIS	None/Present
17	Extent of tumor resection	Complete/Incomplete/Not assessable
18	Detrusor muscle visible	No/Yes/Not assessable
19	Muscle invasion suspected	No/Yes/Not assessable
(IV) Complications and adjuvant therapy		
20	Urethral stricture	No/Yes (management: _____)
21	Intraoperative complications ^a	None/Urethral injury/Bladder perforation/Others (_____)
22	Immediate single instillation	No/Yes (agent: _____)

Abbreviations: CIS, carcinoma in situ; ECOG-PS, Eastern Cooperative Oncology Group performance status; NBI, narrow-band imaging; PDD, photodynamic diagnosis; TURBT, transurethral resection of bladder tumor; UTI, urinary tract infection; UTUC, upper tract urothelial carcinoma.

^aIndicates that multiple selections are permitted.

risk tables derived from 2596 patients with Ta/T1 disease [11]. In addition, capturing index tumor morphology is particularly informative, as sessile/solid-appearing tumors have been associated with worse recurrence- and progression-free outcomes [26]. Documenting the extent of tumor resection (complete/incomplete/uncertain) is also essential because incomplete resection—or uncertainty regarding completeness—indicates the need for repeat TURBT and directly influences subsequent management [3, 4]. Recording whether the detrusor muscle is visible in the resection bed and/or obtained in the specimen is

also a key TURBT quality indicator, as its absence in the initial resection is associated with residual disease, understaging, and may prompt repeat TURBT [3, 4]. Furthermore, complete macroscopic tumor resection (including detrusor muscle sampling when appropriate) has been linked to a reduced risk of intravesical recurrence [5, 9]. Finally, documenting “muscle invasion suspected” is important because the surgeon’s intraoperative impression informs immediate staging and triage, particularly when histopathological confirmation is limited or inconclusive (e.g., due to absent detrusor muscle or cautery artifact),

enabling timely referral of suspected muscle-invasive disease to definitive treatment pathways.

3.4 | Complications and Immediate Postoperative Instillation

The fourth core perioperative section addresses perioperative complications and immediate postoperative management. Documenting pre-existing or iatrogenic urethral stricture and its management is important, as urethral narrowing can limit resectoscope access, increase the risk of iatrogenic urethral trauma, worsen postoperative voiding symptoms, and compromise the feasibility of future surveillance or repeat TURBT. Contemporary guidance also identifies transurethral surgery and instrumentation as major iatrogenic causes of urethral stricture, supporting routine capture of this item [4, 27]. In addition, a prospective multicenter cohort of 983 TURBT procedures reported bladder perforation in 4.7% and urethral injury/false passage in 0.4%, underscoring the importance of standardized recording of intraoperative complications [28]. Accordingly, the checklist includes documentation of events such as urethral injury and bladder perforation to support postoperative management and subsequent treatment planning.

These perioperative findings also directly influence the decision to administer immediate single instillation of intravesical chemotherapy. This treatment, delivered within 24 h after TURBT, is intended to eliminate free-floating tumor cells, eradicate microscopic residual disease at the resection bed, and control small lesions that may have been overlooked during resection [3, 4]. However, current guidelines advise against immediate instillation when bladder perforation is overt or suspected, or when bleeding requires bladder irrigation [3, 4]. Therefore, the checklist includes “whether immediate single instillation will be administered” as a mandatory postoperative item, enabling prompt assessment of eligibility while maintaining patient safety.

3.5 | Pre- and Perioperative Visual Mapping of the Bladder Diagram

Finally, an additional domain was included for standardized diagram-based documentation. The bladder diagram is intended to be completed by the operating surgeon as part of the perioperative checklist workflow, particularly for preoperative mapping and documentation of intraoperative tumor findings and resection details. Visual mapping on a bladder diagram standardizes documentation of tumor location, multiplicity, size, mucosal abnormalities, and lower urinary tract anatomy, improving communication and enabling reliable comparison during subsequent TURBT and surveillance. Clinical guidelines strongly recommend recording all macroscopic tumor features and using a bladder diagram [4]. A TURBT quality review emphasizes combining a perioperative checklist with diagram-based documentation to capture tumor locations, noting that this approach may improve outcomes [29]. This surgical checklist is designed to facilitate operative preparation through preoperative mapping and to allow documentation of intraoperative tumor findings and resection details; therefore, the postoperative mapping sheet is provided as a separate figure.

4 | Discussion

4.1 | Potential Impact on TURBT Quality and Outcomes

High-quality TURBT is a modifiable determinant of NMIBC outcomes. Inadequate resection and incomplete documentation can contribute to residual disease, early recurrence, and delayed risk-adapted therapy. Checklists offer an inexpensive and scalable strategy to reduce omission of critical procedural elements. Across published TURBT-specific checklist studies, many of which primarily evaluated operative-note completeness and selected intraoperative quality indicators, checklist implementation has been associated with improved documentation of recurrence- and progression-related risk factors and increased detrusor muscle sampling rates (Table 2) [8–10, 22–25, 30]. Some studies have also reported improved recurrence outcomes after checklist implementation, although the magnitude of benefit and generalizability across practice settings remain uncertain [8, 9].

The present checklist was designed not merely as an operative-report template, but as a broader perioperative framework for TURBT. Previously published TURBT-specific checklists have primarily focused on intraoperative documentation, operative-note completeness, and selected quality indicators, such as tumor characteristics, completeness of resection, and detrusor muscle sampling. In contrast, the present checklist extends its scope to the entire perioperative pathway by explicitly incorporating preoperative patient and tumor assessment, surgical and anesthetic planning, perioperative complications, eligibility for immediate single instillation, and diagram-based visual mapping. This broader structure may improve not only documentation quality but also perioperative safety, interpretation of oncological outcomes, and immediate postoperative decision-making.

4.2 | Implementation Considerations and Evidence-Practice Gap

Checklist implementation does not guarantee adherence. In clinical practice, barriers include perceived time burden, duplication with existing institutional documentation, and variable engagement of the surgical team. Consistent with these implementation considerations, several candidate items were deliberately merged or omitted during Delphi refinement to reduce redundancy and documentation burden, underscoring that real-world usability was considered alongside content validity when the 22-item checklist was finalized. To maximize adoption, the checklist should be integrated into the operative workflow and documentation system (whether paper-based or electronic), and supported by institutional leadership. To facilitate practical implementation, we also developed A4-printable surgical checklist sheets for point-of-care use, comprising general-use/male-anatomy and female-specific versions in both English and Japanese (Tables S2–S5).

4.3 | Limitations and Future Updates

This consensus checklist has some limitations. First, although informed by available evidence and expert opinion, it has not yet

TABLE 2 | Statistical outcome measurements of surgical checklists for TURBT.

Author	Year	Improved data collection	Increased DM sampling	Improved RFS
Anderson C et al. [22]	2016	Yes	No	N/A
Suarez-Ibarrola R et al. [8]	2019	N/A	No	Yes
Taoka R et al. [9]	2021	Yes	Yes	Yes
Kikuchi H et al. [30]	2022	N/A	No	No
Guerero DN et al. [24]	2022	Yes	N/A	N/A
Dave P et al. [23]	2023	Yes	No	No
Del Giudice F et al. [10]	2023	N/A	Yes	N/A
Ryan PC et al. [25]	2025	Yes	N/A	N/A

Abbreviations: DM, detrusor muscle; N/A, not applicable; RFS, recurrence-free survival.

been prospectively validated in a multicenter implementation study. Second, some items, such as cystoscopic suspicion of CIS, extent of tumor resection, detrusor muscle visibility, and suspected muscle invasion, are inherently subjective and may vary by surgeon experience and use of adjunct imaging. Third, the checklist emphasizes documentation and procedural completeness; it does not replace comprehensive clinical judgment or guideline-based decision-making for intravesical therapy and surveillance. Fourth, because it was developed by Japanese experts from university hospitals, its generalizability to broader practice settings, particularly community or low-volume centers, remains uncertain.

Future work should proceed in several concrete steps. First, feasibility, adherence, and associations with quality indicators and patient outcomes should be assessed in a multicenter implementation study that includes university hospitals, community hospitals, and lower-volume centers. Second, an educational companion appendix should be developed with explicit definitions, short descriptors, and representative cystoscopic images for subjective items. In addition, future studies should also evaluate safety endpoints such as bladder perforation, postoperative UTI, and obturator reflex-related events. Iterative updates will be required as new technologies (e.g., enhanced imaging, en bloc techniques, novel energy devices) and guideline recommendations evolve. A digital version integrated with standardized operative reports and registries may further facilitate adoption and quality benchmarking.

In conclusion, a Japanese expert working group developed a 22-item consensus surgical checklist for TURBT encompassing the perioperative pathway. The checklist is intended to standardize key procedural elements and documentation, promote high-quality resection, enhance perioperative safety through risk identification and complication reporting, and support appropriate postoperative management. Prospective evaluation of implementation feasibility, adherence, and associations with clinical outcomes is warranted to establish clinical impact and guide future revisions.

Author Contributions

Nozomi Hayakawa: investigation, writing – review and editing. **Eiji Kikuchi:** supervision, writing – review and editing. **Minoru Kato:**

investigation, writing – review and editing. **Hideo Fukuhara:** investigation, writing – review and editing. **Takeshi Sano:** investigation, writing – review and editing. **Takuto Hara:** investigation, writing – review and editing. **Hajime Tanaka:** investigation, writing – review and editing. **Takashi Matsumoto:** investigation, writing – review and editing. **Kosuke Iwatani:** investigation, writing – review and editing. **Takahiro Osawa:** investigation, writing – review and editing. **Junichi Inokuchi:** writing – review and editing, supervision. **Hiroshi Kitamura:** writing – review and editing, supervision. **Takashi Kobayashi:** supervision, writing – review and editing. **Shingo Hatakeyama:** writing – review and editing, supervision. **Shuichi Tatarano:** writing – review and editing, supervision. **Makito Miyake:** investigation, writing – review and editing. **Mikio Sugimoto:** supervision, writing – review and editing. **Tomokazu Kimura:** investigation, writing – review and editing. **Norio Nonomura:** writing – review and editing, supervision. **Rikiya Taoka:** investigation, writing – original draft, writing – review and editing.

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Conflicts of Interest

Eiji Kikuchi, Hajime Tanaka, Shingo Hatakeyama, Takashi Kobayashi, Junichi Inokuchi, Hiroshi Kitamura, Mikio Sugimoto, and Norio Nonomura are Editorial Board members of the International Journal of Urology and contributed to the development of the surgical checklist. To minimize potential bias, they were excluded from all editorial decision-making related to this manuscript.

Data Availability Statement

Additional information regarding the checklist development process is available from the corresponding author on reasonable request.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section. **Table S1:** Voting results for all 30 candidate items in the modified Delphi process and reasons for final inclusion or exclusion. **Table S2:** A4-printable TURBT surgical checklist sheet, general-use version with male-specific lower urinary tract annotations, in English. **Table S3:** A4-printable TURBT surgical checklist sheet, female-specific version, in English. **Table S4:** A4-printable TURBT surgical checklist sheet, general-use version with male-specific lower urinary tract annotations, in Japanese. **Table S5:** A4-printable TURBT surgical checklist sheet, female-specific version, in Japanese.