Improving practice patterns in patients with newly diagnosed bladder masses treated with transurethral resection

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Abstract

Context: Transurethral resection (TUR) is the mainstay for diagnosis, staging, and treatment of both high-grade and low-grade nonmuscle invasive bladder cancer (NMIBC). It is reported that 51% of initial transurethral resection of bladder tumors (iTURBT) does not contain muscle, which results in higher rates of clinical upstaging on repeat transurethral resection (reTUR) and worse oncologic outcomes. Presence of muscle on iTURBT specimen and performing reTUR within 6 weeks in high-risk NMIBC aids in accurate staging and, therefore, guides proper treatment.

Objectives: This study aimed to assess and improve TURBT quality by making surgeons aware of their practice patterns and setting improvement goals.

Methods: Patients who received TURBT for a newly diagnosed bladder mass were analyzed by retrospective chart review for 9 months prior to quality improvement (QI) intervention. Data were collected pertaining to muscle presence/absence on biopsy, pathology of the tumor, risk stratification, whether reTUR was indicated, and time to reTUR. The primary endpoints were the presence of muscle on initial TURBT, whether a reTUR was performed when indicated, and mean time to reTUR in days. The QI intervention, physician education, was then implemented by presenting initial performance results to the physicians, and a second dataset was then collected by prospective analysis for another 9 months to assess for changes in practice patterns. A total of 101 patients receiving TURBT were reviewed, including 52 patients prior to and 49 patients following QI intervention. Patients with a history of, or treatment for, bladder cancer were excluded, along with those without assessment of muscle on pathological analysis. Fisher's exact test was utilized to determine differences in categorical data by comparing each of the following groups prior to and following QI intervention: percent of muscle presence on iTURBT, percent reTUR performed when indicated, and mean time to reTUR in days. A p<0.05 was considered statistically significant.

Results: After comparing the TURBT results before and after our QI intervention, we found a significant improvement in the number of patients receiving a reTUR when indicated, with 5/13 (38.5%) before compared to 15/19 (78.9%) after, p=0.03. The number of specimens on iTURBT with muscle present were not significantly different, with 38/52 (73.1%) before and 33/49 (67.3%) after, p=0.66. The average time to reTUR before (32.4 days; n=5; range, 21–50 days) and after (42.4 days; n=15; range, 11–77 days) QI intervention was also not significantly different, p=0.28.

Conclusions: Our data suggest that critical analysis of physician practice patterns followed by education and setting improvement goals can significantly impact clinical practices and improve quality of care. Future studies will be performed to determine the impact that these changes have on oncologic outcomes.

Keywords: bladder mass; practice patterns; quality improvement; surgery; transurethral resection; TURBT; urology.
tumor invasion (broad or tentacular), to remove all visible tumors, and to provide an adequate specimen to determine histologic type and grade [1]. This information then guides treatment, prognosis, and follow-up.

Two proposed quality metrics are recommended to improve accurate staging in NMIBC include obtaining detrusor muscle (DM) on initial specimen and performing a repeat TUR (reTUR), ideally within 6 weeks following iTURBT, for high-risk, high-grade Ta and T1 tumors [2]. The importance of obtaining DM on initial specimen is to provide the pathologist with an adequate sample to determine the depth of invasion; however, in a study involving 217 cases, it has been reported that 51% of iTURBT specimens are without muscle [3]. According to a study involving 78 patients who underwent radical cystectomy, if muscle is absent on the initial specimen, the rate of clinical upstaging on reTUR can increase from 30% to 40–64% [4]. Similarly, in a study involving 1,312 patients undergoing reTUR, 15–30% were clinically upstaged compared 45% when muscle was absent from iTURBT [5]. This clinical upstaging is associated with worse oncologic outcomes.

A reTUR has both significant therapeutic and diagnostic benefits by means of reassessing staging and removal of residual tumor [2]. In 65% of high-grade Ta tumors and 78% of T1 tumors, residual tumor has been reported on reTUR (n=1,312) [1]. These data suggest a high frequency of incomplete resection on iTURBT. Many factors contribute to the difficulty of obtaining complete resection on iTURBT, including multiple tumors, poorly defined margins, and increasing edema and bleeding as the resection proceeds. A reTUR offers time for inflammation and edema to subside, offering the surgeon better visualization of the tumor that facilitates a more complete resection. By obtaining a more complete resection, we can reduce the frequency of subsequent tumor recurrence and delay early tumor progression. In a study of 347 patients, with 132 undergoing single TUR and 215 undergoing restaging TUR, reTUR has been shown to decrease 3-year recurrence rates by 42–58% as well as improve response to intravesical bacillus Calmette-Guerin (BCG) therapy by 24–35% [6].

While urologists may be aware of the diagnostic and therapeutic value of obtaining muscle on iTURBT and performing a reTUR within 6 weeks thereafter, they may not be aware of their own practice patterns pertaining to those values. Self-assessment can serve as an excellent vehicle for improvement. The aim of this study is to assess practice patterns surrounding muscle presence on iTURBT and reTUR and to determine if physician awareness of their practice patterns and setting improvement goals leads to improved performance. We hypothesize that physician awareness of their performance will lead to higher rates of muscle presence on iTURBT and higher rates of reTUR when indicated.

Methods

This is a quality improvement (QI) study and does not involve any patient intervention; therefore, it is exempt from Institutional Review Board approval. There was no funding for this study. Because this is not a clinical trial, there is no clinical trial registry number. Informed consent was not required, and there was no patient compensation.

This retrospective review and prospective analysis examined patients undergoing TURBT for a newly diagnosed bladder mass under the care of nine urologists. Patients with a prior history of bladder cancer diagnosis or treatment and those without assessment of muscle presence or absence on pathological analysis were excluded. Race and ethnicity were not considered in this study because our team decided it was not relevant to the context of QI.

Initial data were collected retrospectively between January 2018 and September 2018 and examined 52 patients undergoing iTURBT for newly diagnosed bladder tumors, including 13 requiring reTUR based on risk status. The primary endpoints were the presence of muscle on initial TURBT, whether a reTUR was performed in high-risk and non–muscle-invasive tumors, and time to reTUR. Muscle presence and risk stratification were determined through review of pathology records, with high-risk tumors requiring reTUR being staged as HGT1 or HGTa >3 cm. These data were obtained by chart review and compiled in a Microsoft Excel spreadsheet for each individual surgeon. Another combined group list of all surgeons was compiled. Overall percentages of muscle presence on iTURBT and performing reTUR when necessary, along with average time to reTUR, were calculated from this raw data.

QI intervention was then performed by educating the physicians of their practice patterns through a Microsoft PowerPoint presentation, during which both group performance and individual performance with identities hidden were presented to the surgeons. The specific improvement goals set and presented to the urologists following review of initial data were >75% of iTURBT specimens with muscle present, >60% of reTUR performed when indicated, and reTUR performed within 42 days from iTURBT. Following QI intervention, the data were collected prospectively between September 2019 and April 2020, examining 49 patients undergoing iTURBT for newly diagnosed bladder tumors, including 19 patients requiring reTUR. At the end of the prospective period, percent muscle presence on biopsy, percent reTUR performed when necessary, and average time to reTUR were recalculated. Analysis was performed utilizing Fisher’s exact test in Microsoft Excel to determine differences in categorical data. A p<0.05 was considered statistically significant. Data collection and analysis were performed by Dr. Joe Zanghi, Daniel Drach, and Joshua Wilson.

Results

Prior to our QI intervention, we examined 52 patients undergoing iTURBT including 13 patients requiring reTUR for high-risk NMIBC under the care of nine surgeons. The average age was 73.8 years (n=52; range, 48–94 years; SD, 9.3). DM was obtained and assessed in 38/52 (73.1%) of
specimens, and a reTUR was performed when indicated in 5/13 (38.5%) patients. Average time to reTUR prior to QI intervention was 32.4 days (n=5; range, 21–50 days). Following QI intervention, 49 patients undergoing iTURBT, including 19 requiring reTUR, were examined. The average age was 71.3 years old (n=49; range, 45–92 years; SD, 12.4). DM was present and commented on in 33/49 (67.3%) specimens, and 15/19 (78.9%) patients requiring reTUR underwent the procedure. The average time to reTUR following QI intervention was 42.4 days (n=15; range, 11–77 days).

The rate of reTUR when indicated significantly increased from 38.5% (5/13) to 78.9% (15/19) (p=0.003) following QI intervention (Figure 1). The difference in rates of DM sampling (73.1–67.3%; p=0.66) and the average time to reTUR prior to and after QI intervention (32.4–42.4; p=0.28) were not statistically significant.

Discussion

Accurate pathological staging is crucial for proper management of bladder cancer, because pathologic upstaging is associated with worse outcomes [4]. A complete initial resection, which includes adequate DM sampling and removal of all visual tumor, is essential to achieve accurate staging and optimize prognosis [2]. The presence of DM alone has been associated with reduced recurrence rate at the first follow-up cystoscopy and reduced mortality in comparison to iTURBT with DM absent. In a study involving 356 patients with newly diagnosed bladder tumors, both absence and presence of DM were associated with a rate of recurrence at first follow-up cystoscopy of 44.4% and 21.7%, respectively (p=0.002) [7]. In another study involving 1865 patients, mortality in iTURBT with DM absent was 12.1% in comparison to 7.6% when DM was present (HR=1.48) [8]. These findings support the use of DM sampling as a quality metric within the context of NMIBC management.

In addition to a complete initial resection and DM sampling, a reTUR within 6 weeks following iTURBT for high-risk tumors has been shown to improve both staging accuracy and oncologic outcomes. In a systematic review of 31 manuscripts detailing 8,409 patients, Cumberbatch et al. [9] found upstaging to occur in up to 8% (Ta to >T1) and 32% (T1 to >T2) of cases along with a decrease in recurrence rates from 56% to 16% among Ta tumors. Studies also reported a decreased progression from 21% to 6% among T1 tumors, and reduced mortality from 36% to 30% in T1 tumors among patients who did not receive a reTUR in comparison to those who did (n=210) [10]. A reTUR also provides valuable prognostic information, especially in T1 tumors. Herr and Donat [11] reported

Figure 1: Practice patterns before and after QI intervention compare the frequency of muscle presence on iTURBT, the frequency of reTUR performed when indicated, and the mean time to reTUR before and after QI intervention. Frequency of reTUR performed when indicated was the only statistically significant change, as indicated by the asterisk.
eventual progression of 76% in cases with residual T1 tumor found at reTUR, compared to 56% of cases having any residual tumor by 6 months (n=710). Given the diagnostic, therapeutic, and prognostic benefits of reTUR, we propose that the rate of reTUR performed when indicated is a valuable quality metric.

Despite the aforementioned benefits of adequate DM sampling and performing a reTUR, few have examined the impact of how surgeon awareness of their own practices may lead to improvement of these quality metrics. Awareness of one’s performance has been reported to have significant effects on improving outcomes. Known as the observer effect or Hawthorne effect, this has been observed in studies examining surgery checklists and efforts to mitigate adverse events in hospitals [12, 13]. Our surgeons were given a presentation with a report showing a compilation of their individual and group results taken from our raw data. Although we did not observe a significant difference in DM sampling following QI intervention, Das et al. [14] recently reported significant improvements in DM sampling (36–54%, n=3,861) following distribution of DM sampling “scorecards” to surgeons. We did, however, observe a substantial increase in the rate of reTUR performed when indicated, with the rate increasing from 38.5% to 78.9% after surgeons were made aware of their practice patterns. These results, in addition to those reported by Das et al., illustrate the capacity of QI interventions utilizing the observer effect to improve surgeon practice patterns within the context of NMIBC management. In addition to improved DM sampling rates, Das et al. [14] also observed improved oncologic outcomes as the result of administration of DM sampling scorecards with decreased 3-year risk of recurrence (HR=0.63). Although this study evaluated the impact of physician awareness of their practice patterns on the diagnosis and treatment of newly diagnosed bladder cancer, it did not examine changes in oncologic outcomes with respect to the QI intervention. Future studies will be conducted to determine if the observed increase in reTUR following our QI intervention leads to improved oncologic outcomes.

This study provided valuable information about the power of physician awareness on QI, but it did not come without its limitations. We were not able to control for individual physician skill, experience, or surgical volume of TURBT cases in our analysis. Another limitation is the relatively low sample size for the study. During our prospective data collection, the world was hit with the COVID-19 pandemic. It is impossible to say exactly what effect this had on our study results, but we do know that this had a significant impact on healthcare as a whole. Many elective cases were canceled, and we experienced a lower surgical volume. Patients also became hesitant to visit hospitals, which may have affected our patient population and follow-up times.

Conclusions
Assessing surgeon practice patterns surrounding reTUR and setting improvement goals improved the rate of reTUR when indicated for NMIBC. Following the QI intervention in which surgeons were made aware of their rates of DM sampling, reTUR rate when indicated, and time to reTUR, the rate of reTUR when indicated increased from 38.5% to 78.9%. Along with previous studies illustrating the success of QI interventions to improve DM sampling, our study suggests surgeon awareness of reTUR rates when indicated and setting specific goals of reTUR can also improve performance. Future studies will be conducted in order to assess how these changes in practice patterns following QI intervention affect oncologic outcomes.

TUR is a mainstay in both the diagnosis and treatment of NMIBC. Two quality control measures surrounding TUR that have shown improved outcomes are obtaining DM on the initial resection and performing a repeat resection for high-risk tumors within 6 weeks. The observer effect has been documented as an effective tool for improving DM sampling rates. This study illustrates that the observer effect is also an effective tool in improving rates of repeat TUR performed when indicated. Therefore, clinical practice surrounding TUR for newly diagnosed bladder tumors may benefit from enhanced surgeon awareness of their own practice patterns.

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References