

A retrospective analysis of the factors associated with increased risk of readmission within 30 days following primary transurethral resection of bladder tumour

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Abstract

Background Transurethral resection of bladder tumour (TURBT) is associated with a perioperative morbidity of 5-10% which can lead to unplanned readmissions. In this study, we aim to identify factors that lead to an increased risk of unplanned readmissions within 30 days of primary TURBT. **Methods** A retrospective study was conducted to identify patients who had their primary TURBT at our institute from 2011-2019. The clinico-demographic factors, history of smoking, intake of anti-platelet drugs, co-morbidities, tumour size (< 3 cm or > 3cm), multifocality and histopathological type were abstracted. The patients who had a readmission were identified and reasons for admission were recorded. **Results** A total of 435 patients were identified. The median age was 66 years. There were 378 (86.9%) males, 110 (25.3%) had history of smoking and 37 (8.5%) had history of intake of an anti-platelet agent. In the cohort 166 (38.2%) were diabetic, 239 (54.9%) were hypertensive, 72 (16.6%) had COPD, 78 (7.9%) had hypothyroidism. A total of 206 (47.4%) had a tumour of >3cm, multifocality was seen in 140 (32.2%) while muscle invasive tumour was present in 161 (37%) patients. A total of 22 (5.06%) had re-admissions within 30 days with hematuria being the commonest etiology. On the univariate and multivariate analysis, history of smoking (p=0.006 and 0.008, respectively) or intake of anti-platelet agents (p<0.001 and <0.001, respectively) were significantly associated with increased unplanned readmission. **Conclusion** Our study revealed smoking and intake of anti-platelet agents as the factors leading to increased risk of unplanned readmissions.

A retrospective analysis of the factors associated with increased risk of readmission within 30 days following *primary*transurethral resection of bladder tumour

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Abstract

Background Transurethral resection of bladder tumour (TURBT) is associated with a perioperative morbidity of 5-10% which can lead to unplanned readmissions. In this study, we aim to identify factors that lead to an increased risk of unplanned readmissions within 30 days of primary TURBT.

Methods A retrospective study was conducted to identify patients who had their primary TURBT at our institute from 2011-2019. The clinico-demographic factors, history of smoking, intake of anti-platelet drugs, co-morbidities, tumour size (< 3 cm or > 3cm), multifocality and histopathological type were abstracted. The patients who had a readmission were identified and reasons for admission were recorded.

Results A total of 435 patients were identified. The median age was 66 years. There were 378 (86.9%) males, 110 (25.3%) had history of smoking and 37 (8.5%) had history of intake of an anti-platelet agent. In the cohort 166 (38.2%) were diabetic, 239 (54.9%) were hypertensive, 72 (16.6%) had COPD, 78 (7.9%) had hypothyroidism. A total of 206 (47.4%) had a tumour of >3cm, multifocality was seen in 140 (32.2%) while muscle invasive tumour was present in 161 (37%) patients. A total of 22 (5.06%) had re-admissions within 30 days with hematuria being the commonest etiology. On the univariate and multivariate analysis, history of smoking ($p=0.006$ and 0.008 , respectively) or intake of anti-platelet agents ($p<0.001$ and <0.001 , respectively) were significantly associated with increased unplanned readmission.

Conclusion Our study revealed smoking and intake of anti-platelet agents as the factors leading to increased risk of unplanned readmissions.

Key words: Bladder cancer, Complication, Cystoscopy, Readmission, Urinary bladder surgery

'What is already known about this topic?'

TURBT is associated with high risk of unplanned readmissions. There is dearth of information that can lead to identification of variables associated with readmissions.

'What does this article add?'

The article identifies the patients at risk of unplanned readmissions after primary TURBT in a contemporary cohort. This can potentially lead to early identification and modification of the factors.

Introduction

Bladder cancer is one of the commonest urological malignancies in clinical practice. The management of disease relies heavily upon transurethral resection of bladder tumour (TURBT) which can be diagnostic as well as therapeutic.¹ TURBT, although considered to be a "safe" surgery, can be associated with complications like hematuria, urinary retention, infections, etc. It has been shown that the perioperative morbidity after TURBT ranges from 5-10%.²⁻⁴

The cost of treatment of patients of bladder cancer can be very high considering the need of surveillance cystoscopies, TURBTs, intravesical therapies, etc.^{5,6} As in the management of any other diseases, it is prudent that efforts are made to decrease the overall cost of management of bladder cancer. Unplanned readmissions have been shown to have a significant economic impact on the health care system.⁷ If the risk factors that lead to unplanned readmissions after TURBT can be identified, we might be able to modify them and decrease the readmissions. In this study, we analyze the patient factors and tumour factors that may help in identifying the patients who have a higher chance of unplanned readmission within 30 days after primary TURBT.

Methods

This was a retrospective study and an exempt was obtained from the Institutional Review Board for this study. The contact details, clinical details, image findings, diagnosis, treatment received, details of histopathology, follow up, of all the patients coming for treatment at our institute is recorded digitally. The data was collected from this institutional digital database which records the information prospectively. The patients who had a TURBT from 2011 to 2019 were identified from the digital surgery log-book. We selected only those patients who had their first TURBT. The patients who had a completion TURBT or a re-staging TURBT or TURBT for recurrences or had no tumour were excluded. As we anticipated that all patients who had a primary TURBT might not come for follow up at our institution, we excluded those who did not have a follow up of three months post-surgery. The clinico-demographic factors like their age at the time of surgery, gender, body mass index (BMI), history of smoking (past/present), intake of anti-platelet drugs (aspirin/aspirin+Clopidogrel/others), diabetes, hypertension, chronic obstructive pulmonary disease (COPD), hypothyroidism or other co-morbidities like Parkinsonism, stroke, renal failure, hematological disorders, liver failure, tuberculosis, etc. were abstracted from the patients' charts. The surgical details were extrapolated from the digital surgery record. The operative findings such as tumour size (< 3 cm or > 3 cm), presence or absence of multifocality and histopathology (low grade transitional cell carcinoma (tcc)/high grade non muscle invasive tcc/muscle invasive/other variants) were also collected. As an institutional protocol, the post operative patients who came for follow up or with any post-operative problems were always assessed by a member from the operating team at the time of primary surgery. We identified the patients who had an unplanned readmission within 30 days of their surgery. The reason for readmissions were recorded from the digital admission slips issued by the admitting team member. They were classified under the categories of hematuria/retention, urinary tract infection/fever and others which included dyselectrolytemia, pain or other cardiac, neurological, respiratory, hematological and gastrointestinal issues.

Technical aspects of TURBT

As an institutional protocol, the antiplatelet agents were stopped 5-7 days prior to the surgery and were started 5-7 days following surgery. The energy source used in all of the procedures was unipolar diathermy. The tumour base was uniformly coagulated by a roly-ball in all cases. A 5 mm margin around the base of the tumour was also scored. A 3-way Foley's catheter was inserted at the end of the surgery and irrigation was continued till the urine cleared up.

Statistical analysis

The statistical analysis was done using the Statistical Package for Social Sciences (SPSS) version 25 (International Business Machine Corporation, New York, USA). The median and ranges were calculated for continuous variables, whereas proportions and frequency tables were used to summarize categorical variables. We performed the Pearsons Chi-square test or independent sample t-test (for nominal data) to assess the impact of each clinico-demographic and tumour factor on the readmission. Multivariate analysis was done using linear regression test. All the variables were included for multivariate analysis. Backward elimination ($p < 0.05$ to remove) was performed to obtain final models. The level of statistical significance for all tests was $p < 0.05$ derived from two-tailed tests

Results

A total of 675 patients were identified of which 435 patients fulfilled the inclusion and exclusion criteria. The median age at the time of the TURBT was 66 years (IQR 58, 73). The median BMI was 25.38 (IQR 22.34, 27.81). Of the total cohort, 378 (86.9%) were males, 110 (25.3%) had a history of smoking and 37 (8.5%) had a history of intake of an anti-platelet agent. In the antiplatelet group, 30 patients had history of aspirin intake while 7 had history of both aspirin and clopidogrel. It was observed that 92 (21.1%) did not have any co-morbidity while 166 (38.2%) were diabetic, 239 (54.9%) were hypertensive, 72 (16.6%) had COPD, 78 (7.9%) had hypothyroidism. It was also seen that 42.3% of patients had more than one co-morbidities. A total of 206 (47.4%) had a tumour of > 3 cm and the tumour was multifocal in 140 (32.2%) of the patients. The muscle invasive tumour was seen in 161 (37%) patients (Table 1). A total of 22 (5.06%) re-admissions

were seen in this cohort. The median time to readmission was 9 days post surgery. The commonest reason for readmission was hematuria/retention which was present in 10 patients followed by urinary tract infections (Table 2). A total of 6 patients needed blood transfusion and 7 required surgical intervention in the form of bladder wash and hemostasis. There was one mortality in the patients readmitted within 30 days due to cardiac cause.

On the univariate analysis, among the clinical factors, only smoking and history of intake of anti-platelet agents were significantly associated with increased unplanned readmission ($p=0.006$; Odds ratio 3.16 and <0.001 Odds ratio 7.55, respectively). The presence of multiple co-morbidities too was not associated with an increased risk of readmission with a p value of 0.75. The tumour related factors like size, multifocality or histopathological findings did not have an association with unplanned readmissions (Table 3).

The multivariate analysis revealed that out of all the factors studied, only smoking and anti-platelet intake were associated with an increased risk of readmission with p values of 0.008 and <0.001 , respectively (Table 3).

Discussion

The unplanned hospital admissions lead to a major financial burden on the health care system. It has been reported that even if 10% of such admissions can be avoided, millions of dollars can be saved, especially in the Medicare and insurance setting.⁸ This has led to a lot of interest by the researches in identifying the factors that can predict the chances of unplanned readmission. In United States, a Hospital Readmissions Reduction Program has been initiated to this effect which penalizes the hospitals which have higher than expected readmission rates.^{7,8} In our country too, a lot of health insurance policies mandate that readmission within 30 days of discharge be considered as a part of the same hospitalization leading to loss of hospital revenues.

TURBT is a commonly performed surgery for bladder cancer. There is a large variation in the reported rates of complications depending upon the study methodology and categorization.²⁻⁴ There are only a few studies that have specifically evaluated the incidence and identified the risk factors of unplanned readmissions after TURBT. To the best of our knowledge, ours is the first such study in a cohort of patients from a developing nation. Ghali et al retrospectively reviewed 708 patients who had a TURBT and found the rate of unplanned readmission to be 4.9%. The major reason was hematuria and on multivariate analysis, the history of Foley's catheterisation in the operating room was the only factor found to be associated with a higher rate of unplanned readmissions.⁹ Austin et al included a total of 172 patients of which 138 patients had a TURBT as a daycare procedure. They reported the rates of readmission within 28 days to be 7.2% in daycare cases and 5.9% in the inpatient cohorts.¹⁰ Pereira et al analyzed 24,100 patients from the National Surgical Quality Improvement Program database which is probably the largest cohort to date. They found the rate of unplanned hospital admissions to be 3.8%. They reported that on multivariate the presence of a higher American Society of Anaesthesiology (ASA) category, tumour size $>5\text{cm}$, and steroid use were associated with a significantly high risk of unplanned readmission within 30 days of surgery. They did not observe a higher risk of readmission for patients with a history of diabetes, smoking, COPD, bleeding disorder, renal failure or heart failure.⁴ Rambachan et al too used the National Surgical Quality Improvement Program database to identify 7,795 patients who had a urologic surgery. They found that though the overall rate of unplanned readmission within 30 days was 3.7%, TURBT had a risk of 4.97% which was the highest among all the surgeries evaluated. They found that higher ASA, bleeding disorders, male gender and age were significant risk factors for readmission.¹¹ Our study had a readmission rate of 5.06% which is similar to the rate seen in previous studies.

We found that the history of smoking or the intake of anti-platelet agents were the only factors that were significantly associated with the risk of unplanned readmission. It has been well documented that smoking is associated with increased risk of major bleeding which can manifest as gastrointestinal, pulmonary or even urological bleeding.¹² The antiplatelet agents too are known to increase perioperative bleeding hence most of the clinicians tend to stop these antiplatelet agents in the perioperative period. The variables associated

with increased risk of readmission in our study are different from the previous studies. This difference may be due to the different selection criteria used in our study that analyzed only those patients who had their first TURBT. Similar to the findings of Pereira et al, we too did not find an association of age, gender or co-morbidities like diabetes, hypertension, COPD, and hypothyroidism with the risk of readmission.⁴ As a significant percentage of patients in our cohort had multiple co-morbidities, we also assessed its effect on readmission and found no significant association.

Our study has several strengths. As the data was extrapolated from the digital database, the problems associated with record retrieval, especially in a long term study, are not there. This makes our data more reliable. The surgical details of TURBT such as the type of energy used (unipolar/bipolar), routine use of roly-ball are often missing in the previous studies, especially the ones using multi-institutional databases.^{4,11} These are potential confounding variables and can have an effect on the results observed in the previous studies. The reasons for readmissions were also the ones that were mentioned by the primary team at the time of admission rather than being analyzed by a third-party from the case history. This avoids the problem of miscategorization of the patients.

There are a few limitations of our study. Firstly, our study is retrospective and hence there can be inadvertent bias. Secondly, it is possible that some patients might not have presented back to our center and were managed outside. To minimize this error, we excluded the patients who did not have a follow up of at least three months after surgery. Thirdly, we did not record the length of hospital stay, duration of catheterisation after surgery, ASA category, operative times, details of the smoking history (pack years), which may have an impact on the risk of unplanned readmissions.^{4,9}

To conclude, our study provides a detailed analysis of a homogeneous, contemporary cohort of patients who had a primary TURBT and identifies the risk factors leading to increased risk of unplanned readmissions within 30 days of primary surgery. The history of smoking or intake of anti-platelet agents can help the clinician in identifying and counselling the patients who are at risk of readmissions.

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