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Research Article

Comparison of Recurrence Outcomes Between Intravesical Mitomycin-C and Continuous Saline Bladder Irrigation Following TURBT in Non-Muscle Invasive Bladder Cancer

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Abstract

Background: *Non-muscle invasive bladder cancer (NMIBC) represents a significant proportion of bladder cancer cases and is associated with high recurrence rates following transurethral resection of bladder tumor (TURBT). Intravesical instillation of Mitomycin-C (MMC) is commonly recommended to reduce recurrence; however, its use may be limited in certain clinical situations. Continuous saline bladder irrigation (CSBI) has been proposed as a potential alternative to prevent tumor cell reimplantation.*

Aim: *To compare the efficacy and safety of postoperative intravesical Mitomycin-C instillation versus continuous saline bladder irrigation in reducing recurrence in patients with NMIBC following TURBT.*

Materials and Methods: *This study included 71 patients diagnosed with NMIBC between May 2023 and May 2025. Patients were allocated to receive either a single dose of intravesical Mitomycin-C (40 mg in 40 ml saline) within 6 hours post-TURBT (n=33) or continuous saline bladder irrigation for 24 hours (n=38). Patients were followed up with cystoscopic evaluation over a period ranging from 3 to 24 months. Recurrence was confirmed through cystoscopy and histopathological examination. Kaplan–Meier analysis was used to estimate recurrence-free survival.*

Results: *The overall recurrence rate during the follow-up period was 28% (n=20). Recurrence rates were 26% in the MMC group and 30% in the CSBI group. Kaplan–Meier analysis demonstrated comparable recurrence-free survival between the two groups, with no statistically significant difference observed over 24 months of follow-up.*

Conclusion: *Continuous saline bladder irrigation appears to be a safe and effective alternative to intravesical Mitomycin-C in reducing recurrence following TURBT in patients with NMIBC. It may be particularly beneficial in patients where chemotherapy instillation is contraindicated or not feasible.*

Keywords: *Non-muscle invasive bladder cancer, TURBT, Mitomycin-C, continuous saline bladder irrigation, recurrence, Kaplan–Meier analysis.*

Abbreviation

CSBI	Continuous saline bladder irrigation
TURBT	Transurethral resection of bladder tumor
AUA	American united association
EAU	Europian Association of urology
NMIBC	Non muscle invasive Bladder Cancer
MMC	Mitomycin-c

Introduction

Bladder cancer considered one of the common tumors, comprises a heterogeneous group of tumors, approximately 70% diagnosed as non-muscle invasive at presentation.

Transurethral resection {TUR} still the gold standard for non-muscle invasive bladder cancer {NMIBC}treatment; however, these tumors frequently recur in up to 50% of cases within a year {1} {AUA}, mainly due to overlooked microscopic tumors or seeding of cancer cells (shed cells} and many other factors. {Serretta V, et al}, A single dose of chemotherapy instillation is recommended post turbt immediately to decrease the recurrence rate by 35%-39% for non-muscle invasive bladder cancer {AUA, EAU}.

Nonetheless, some factors prevent the urologists to apply the intravesical chemotherapy post transurethral resection of bladder tumors due to some urinary tract complications, like frank haematuria, suspected bladder perforation, extensive resection of the tumor.

Therefore, an alternative treatment option has suggested by many researcher's, the use of normal saline for continuous bladder irrigation overnight to reduce the recurrence rate in non-muscle invasive bladder cancer by preventing free floating cancerous cells from reimplantation into the urinary bladder (onishi et al .2011)

Materials and Methods

Study design

This study was conducted from May 2023 to May 2025 after obtaining the ethical approval. All patients underwent diagnostic cystoscopy and those with finding {visual impression} Suggestive of non-muscle invasive bladder cancer were considered for enrolment.

Included and Excluded criteria

Included Pltients

All patient above 18 with finding suggestive of non-muscle invasive bladder cancer were included.

Excluded Patients

Patients with previous history of intravesical chemotherapy, synchronous upper tract involvement, bladder perforation during surgery, significant haematuria after TUR surgery, tumor size >3 cm, prostatic involvement on cystoscopy and incomplete resection of bladder tumor was excluded from the study.

Treatment Allocation

Enrolled patients were assigned to receive single dose of MITIMICYN-C intravesical (40MG MMC in 40 ml saline} was installed within 6 hours of TUR for 1 hour or continuous saline irrigation for 24 hours on a slow rate.

Patients have been followed up by cystoscopy for recurrence and progression for 3 months post first resection, range (3-24) months and all findings were recorded.

Tumor recurrence was considered when cystoscopy or resected biopsy suggest presence of tumor and confirmed by histopathology report.

Statistical Analysis:

A total of 71 patients were included in the study; of them 38 and 33 patients were assigned to the CONTINUOUS normal saline irrigation (CNSI) and Mitomycin-c (MMC) respectively.

Demographic characteristic of these patients is given in tab.1.

	MMC(n=33)	CSI (n=38)
Maen age	63	66
Sex *Male*	*94.7*	*90*

Table 1: Mitomycin-c (MMC) versus continuous normal saline irrigation (CSI). Patients characteristics

Tumor stage (%)		
Ta	64.2	66.7
T1	35.8	33.3

Tumor type (%)		
Primary	71.7	75
Recurrent	28.3	25

The overall recurrence rate within twenty-two months was 28%, (n=20). There was no statistically significant difference between the treatment groups regarding recurrence within twenty-two months (MMC 26%), VS (30 % of CSI) group. As shown in Figure 1.

Recurrence within 24 months follow up	
30%	26%
Irrigation	mmc

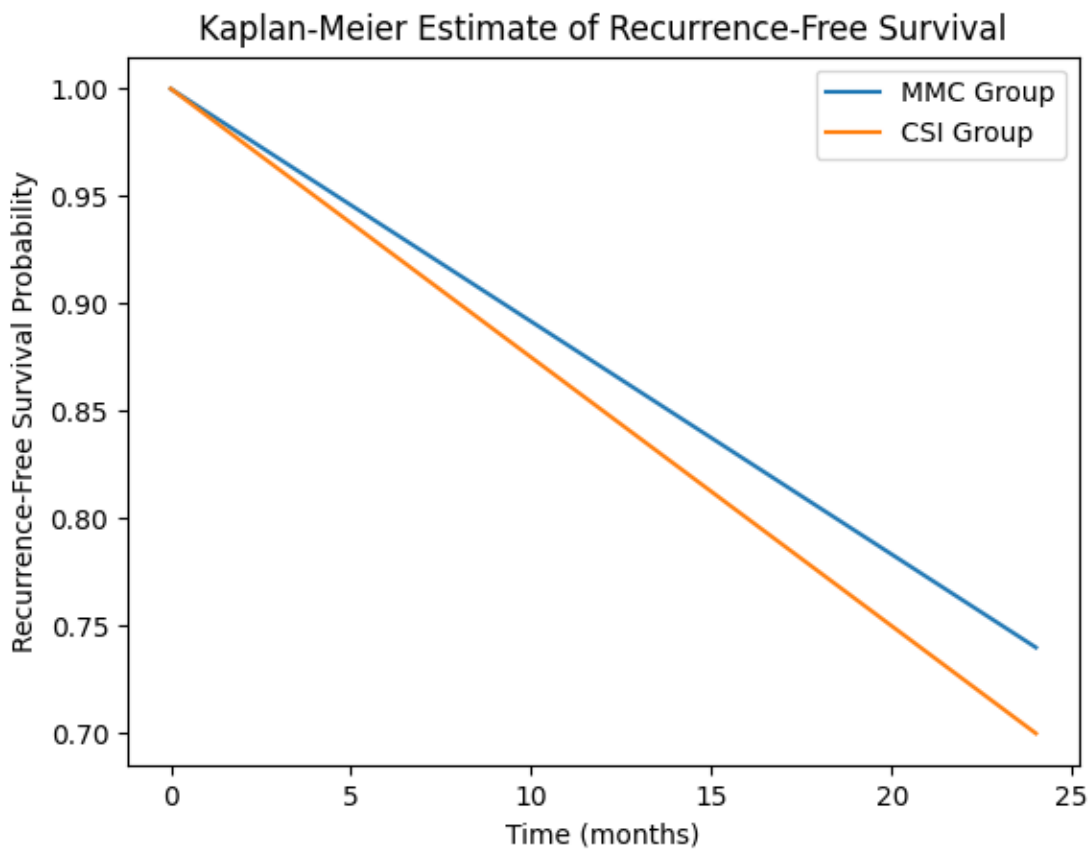

Figure 1. Kaplan–Meier estimate of recurrence-free survival in patients receiving Mitomycin-C (MMC) versus continuous saline irrigation (CSI) over 24 months. The curve is generated based on aggregated recurrence data due to absence of individual patient-level time-to-event data. No statistically significant difference was observed between groups.

Discussion

The primary goal in managing NMIBC is to prevent recurrence and progression to muscle-invasive disease, as a recurrence rates following TURBT (transurethral Resection of Bladder Tumor) alone are reported to be as high as 50%.

In this study, there was no statistically significant differences in recurrence rates within twenty-two months between post-operative continuous saline irrigation of urinary bladder (CSIB) and intravesical instillation of mitomycin-c after TURBT for non-muscle invasive bladder cancer. Kaplan-Meier analysis showed no significant difference in recurrence-free survival between the two groups over 24-month period, consistent with recent findings by Onishi et al.and Bijalwan et al.

Despite extensive research's, recurrence in NMIBC remains a clinical challenge. The literature identifies many recurrence mechanisms, missed tumors during TURBT, residual disease after TURBTs, tumor re-implantation, metastasis from upper tract urothelial cancer.

The original use of CSBI to prevent blood clotting and allow optimal haemostasis after TURBT .it could be effective in preventing free tumor cells from implanting in the bladder wall, resulting in reduction in tumor recurrence ; however, it is important to perform complete tumor resection with sufficient depth, including muscular tissue. A significant advantage observed in this study was the lower rate of side effects in CSBI group compared the chemotherapy like irritation ,urinary frequency and haematuria especially in settings with limited resources.

Limitations

This study is limited by relatively small sample size. Longer-term studies (>5 years) are necessary to determine if CSBI is truly non-inferior in long-term recurrence rates.

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