

Non-Invasive Bladder Cancer Treatment

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ABSTRACT	ARTICLE DETAILS
Introduction: Bladder cancer represents a spectrum of diseases ranging from superficial, well-differentiated disease, which does not significantly affect survival, to highly malignant tumors for which long-term survival can be dismal. Materials and Methods: Literature review in the PubMed database published from January 2019 to May 2024 using combinations of the following keywords: bladder cancer, treatment, non-invasive, innovations. References included in previously published review articles were also scanned and relevant papers were included. Results: According to studies reviewed over the past 5 years, approximately 75% of patients with bladder cancer initially present with non-muscle invasive tumors. NMIBC can be classified as low, intermediate, or high risk, depending on the presence of characteristics (such as grade, stage, tumor size, number of tumors, presence of carcinoma in situ, and prior recurrence rate) that increase the likelihood of progression to MIBC. Low-risk NMIBC (solitary, small, low-grade, and noninvasive, pTa) accounts for approximately 50% of all new bladder cancers [5]. Low- and intermediate-risk tumors have a low risk (0.8–6%) of progression to MIBC or bladder cancer-specific mortality within 5 years, but have a high recurrence rate (31–62%), especially if multifocal. International guidelines therefore recommend periodic cystoscopic surveillance for at least 5 years. Tumor recurrence usually requires a new transurethral resection of the bladder tumor (TURBT) or cystodiathermy under anesthesia, followed by a return to an intensive cystoscopic surveillance program. This process explains the high cost of long-term treatment of NMIBC, as well as the discomfort and negative effects on health-related quality of life for patients with this condition. Conclusions: Early diagnosis and treatment are essential for improving outcomes, as bladder cancer can range from noninvasive forms, which are limited to the inner layers of the bladder, to invasive types that penetrate deeper and can spread to other parts of the body. KEYWORDS: bladder cancer, non-invasive treatment, innovation, radiotherapy, surgery.	Published On: 16 May 2025 Available on: https://ijrsr.org/

INTRODUCTION: Bladder cancer is the 10th most common cancer worldwide. In 2020, there were over 573,000 new cases of bladder cancer. It is the 13th most common cause of cancer death, with an estimated 212,000 deaths worldwide [2]. Low-grade non-muscle-invasive bladder cancer (NMIBC) is usually successfully managed by transurethral resection (TUR), and overall survival for NMIBC is reported to be as high as 90%. However, long-term survival for muscle-invasive bladder cancer (MIBC) and metastatic bladder cancer remains poor[1].

MATERIALS AND METHODS: Literature review in the PubMed database published from January 2019 to May 2024 using combinations of the following keywords: bladder cancer, treatment, non-invasive, innovations. References included in previously published review articles were also scanned and relevant papers were included.

RESULTS: According to studies reviewed over the past 5 years, approximately 75% of patients with bladder cancer initially present with non-muscle invasive tumors. NMIBC can be classified as low, intermediate, or high risk, depending on the presence of characteristics (such as grade, stage, tumor size, number of tumors, presence of carcinoma in situ, and prior recurrence rate) that increase the likelihood of progression to MIBC.

Low-risk NMIBC (solitary, small, low-grade, and noninvasive, pTa) accounts for approximately 50% of all new bladder cancers [8]. Low- and intermediate-risk tumors have a low risk (0.8–6%) of progression to MIBC or bladder cancer-specific mortality within 5 years, but have a high recurrence rate (31–62%), especially if multifocal. International guidelines therefore recommend periodic cystoscopic surveillance for at least 5 years. Tumor recurrence usually requires a new transurethral resection of the bladder tumor (TURBT) or cystodiathermy under anesthesia, followed by a return to an intensive cystoscopic surveillance program. This process explains the high cost of long-term treatment of NMIBC, as well as the discomfort and negative effects on health-related quality of life for patients with this condition.

Outpatient diathermy and laser ablation have good short-term efficacy in patients with low-grade NMIBC and reduce the need for intervention under general/regional anesthesia. The procedures are well tolerated, with low complication rates. The overall certainty of the evidence is low, with heterogeneity between studies and methodological limitations [6].

DISCUSSION: Non-invasive bladder cancer (NIBC) is a form of the disease in which cancerous cells have not yet invaded the bladder wall. It is usually diagnosed at an early stage and can be effectively treated with treatment options that avoid extensive surgery or systemic chemotherapy. Treatment is often focused on preventing recurrence and maintaining a good quality of life for the patient.

ENDOSCOPIC TREATMENT. The first-line treatment for non-invasive bladder cancer is transurethral resection of the bladder tumor (TURBT). This procedure involves removing the tumor through a tube inserted through the urethra. Although TURBT can be effective in eliminating visible tumor, it does not prevent recurrence or progression of the disease, and patients may require additional treatments with Intravesical Instillations[7].

INTRAVESICAL INSTILLATIONS are an important part of the treatment of non-invasive bladder cancer, with the role of preventing relapses. The substances used include:

-Bacillus Calmette-Guérin (BCG): It is considered the standard of care for high-risk non-invasive bladder cancer. BCG stimulates the immune system to attack tumor cells. Studies have shown that BCG instillations significantly reduce the risk of relapse, but are associated with local and systemic side effects.

-Mitomycin: These chemotherapeutic agents are often used for patients who cannot tolerate BCG or in less severe cases. They can help reduce the risk of relapse, but are not as effective as BCG[4].

INNOVATIVE TREATMENTS. In recent decades, research has opened up new avenues for the treatment of non-invasive bladder cancer. Recent clinical trials are underway to evaluate the efficacy and safety of newer treatments, such as:

Immunotherapy: Drugs that target immune checkpoints, such as PD-1 and PD-L1 inhibitors, have shown promise in advanced cancer treatments, and research is underway to adapt them for non-invasive treatments[9].

Antiviral or biologic therapy is based on the idea that certain viruses or biological agents may be able to target and destroy cancer cells, offering an innovative approach to non-invasive treatments[11].

Treatment Challenges and Management of Recurrence. One of the challenges in the treatment of non-invasive bladder cancer remains recurrence. Even after complete tumor resection and BCG instillations, patients may experience disease recurrence, which may require additional treatments and ongoing monitoring. Recurrences may be associated with greater disease aggressiveness and risk of progression to invasive stages, underscoring the importance of long-term management [10].

Future Treatment Outlook. Targeted therapies that specifically target the biological characteristics of individual patients' tumors. In addition, the use of advanced imaging techniques and biomarkers could help to monitor treatments more effectively and identify relapses earlier[5].

CONCLUSIONS: The results of currently available studies have suggested that adjuvant chemotherapy may delay relapse, which may justify the administration of chemotherapy in those at high risk of relapse [3]. Approximately 40% of patients with NMIBC ultimately fail BCG therapy. Options are limited for patients with BCG-refractory/recurrent NMIBC. Radical cystectomy is curative but is associated with high morbidity. In addition, many patients with bladder cancer are elderly and have multiple comorbidities that preclude surgery.

List of Abbreviations:

BC-bladder cancer;

BCG-Bacille Calmette-Guerin;
ICI-immune checkpoint inhibitor;
MIBC-muscle-invasive bladder cancer;
NMIBC-non-muscle invasive bladder cancer;
TURBT-transurethral resection of bladder tumor;
TUR-transurethral resection;

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