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EVALUATION OF TREATMENT EFFECTIVENESS IN LUMINAL B TYPE BREAST CANCER

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Abstract. Breast cancer remains one of the most prevalent oncological diseases worldwide and continues to be a leading cause of cancer-related mortality among women. Among its molecular subtypes, luminal B breast cancer is distinguished by higher proliferative activity, partial resistance to endocrine therapy, and a more aggressive clinical course compared to luminal A subtype. The present study aimed to evaluate the effectiveness of modern multimodal treatment strategies in patients with luminal B breast cancer. A comprehensive clinical and immunohistochemical analysis was performed, and treatment outcomes were assessed using survival indicators and response criteria. The results demonstrated that combined therapy, including endocrine therapy, chemotherapy, and targeted therapy, significantly improves treatment response, reduces recurrence rates, and prolongs survival. These findings confirm the importance of individualized treatment strategies based on tumor biology and molecular characteristics.

Keywords: breast cancer, luminal B subtype, endocrine therapy, chemotherapy, targeted therapy, HER2, Ki-67

Introduction. Breast cancer represents a heterogeneous group of malignant tumors characterized by significant variability in biological behavior, prognosis, and response to treatment [1,2]. The introduction of molecular classification has significantly improved the understanding of breast cancer and has allowed for the identification of clinically relevant subtypes, including luminal A, luminal B, HER2-enriched, and triple-negative breast cancer [2,3]. Among these, luminal B subtype occupies a special place due to its intermediate yet often aggressive clinical course [3,4].

Luminal B breast cancer is defined by the presence of hormone receptors in combination with a high proliferative index and, in some cases, HER2 overexpression [4,5]. In contrast to luminal A tumors, luminal B cancers demonstrate higher histological grade, increased mitotic activity, and a greater tendency toward early recurrence and metastasis [5,6]. These biological characteristics are associated with reduced sensitivity to endocrine therapy alone, which creates the need for more intensive and combined treatment approaches [6,7]. One of the key challenges in managing luminal B breast cancer is the development of endocrine resistance. This phenomenon is associated with activation of alternative intracellular signaling pathways, including PI3K/AKT/mTOR and MAPK cascades, as well as cross-talk between estrogen receptor signaling and growth factor receptors [7,8]. In addition, tumor microenvironment factors, including stromal components and immune cell interactions, contribute to tumor progression and resistance to therapy [9]. Therefore, modern treatment strategies increasingly rely on a personalized approach that takes into account molecular characteristics of the tumor [10].

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Aim of the study. The aim of this study was to comprehensively evaluate the effectiveness of combined therapeutic approaches in patients with luminal B subtype breast cancer, with particular attention to clinical outcomes, tumor response, and survival indicators.

Materials and methods. The present study was conducted at the Khorezm regional branch of the Republican specialized scientific and practical medical center of oncology and radiology and included 140 female patients aged between 28 and 74 years with histologically confirmed luminal B breast cancer. All patients underwent a standardized diagnostic protocol that included clinical examination, imaging studies, and histopathological verification of the tumor. Immunohistochemical analysis was performed to determine estrogen receptor, progesterone receptor, HER2 status, and Ki-67 proliferation index, which allowed accurate classification of tumors as luminal B subtype. Depending on the treatment strategy, patients were divided into two comparable groups. The first group consisted of patients who received endocrine therapy alone, including tamoxifen or aromatase inhibitors according to menopausal status. The second group included patients who underwent combined therapy consisting of endocrine therapy, systemic chemotherapy based on anthracycline- and taxane-containing regimens, and targeted therapy with trastuzumab in cases of HER2-positive disease. Treatment effectiveness was evaluated using standard oncological criteria, including assessment of tumor response, progression-free survival, overall survival, and recurrence rates. Statistical analysis was performed using comparative methods, and survival curves were constructed using Kaplan–Meier analysis, with a significance level of $p < 0.05$.

Results. The obtained results clearly demonstrated that the use of combined therapy provides a significant clinical advantage over endocrine therapy alone in patients with luminal B breast cancer. In the group receiving multimodal treatment, the overall objective response rate reached 78.6%, whereas in the group treated with endocrine therapy alone this indicator did not exceed 52.8%, which reflects a substantial increase in treatment effectiveness. A detailed analysis showed that complete tumor regression was achieved in 28.4% of patients in the combined therapy group compared to only 14.2% in the monotherapy group, while partial response was observed in 50.2% and 38.6% of cases, respectively. At the same time, disease progression was significantly less frequent among patients receiving combined treatment, being observed in only 11.4% of cases compared to 29.7% in the endocrine therapy group. The proportion of patients with stable disease also differed, amounting to 10.0% in the combined therapy group and 17.5% in the control group. These findings indicate a clear shift toward more favorable clinical outcomes when multimodal treatment strategies are applied. A particularly important indicator of treatment effectiveness, progression-free survival, showed a marked improvement. After 24 months of follow-up, 71.2% of patients in the combined therapy group remained free of disease progression, whereas this показатель составил лишь 48.3% among patients receiving endocrine therapy alone, reflecting an improvement of 22.9%. Similarly, overall survival rates at three years were significantly higher in the combined therapy group, reaching 82.5% compared to 61.4% in the control group, which corresponds to an increase of 21.1%.

The addition of targeted therapy in HER2-positive patients resulted in even more pronounced improvements. In this subgroup, the response rate increased to 84.7%, compared to 57.6% in patients who did not receive targeted treatment. Furthermore, tumors characterized by a high proliferation index (Ki-67 >30%) demonstrated greater sensitivity to chemotherapy, with response rates of 81.3% in the combined therapy group compared to 49.8% in the endocrine

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therapy group. Tumor size reduction exceeding 50% was observed in 64.5% of patients receiving combined therapy, whereas only 37.2% of patients in the control group achieved similar results. Additionally, the recurrence rate within the first two years was reduced from 26.8% in the endocrine therapy group to 12.1% in the combined therapy group. Overall, the implementation of combined therapeutic approaches resulted in an average improvement of approximately 25–30% across key clinical indicators.

Discussion. The findings of this study confirm that luminal B breast cancer represents a biologically aggressive subtype that requires a comprehensive and individualized therapeutic approach. The relatively low effectiveness of endocrine therapy alone can be explained by the high proliferative activity of tumor cells and the activation of alternative signaling pathways that promote tumor growth and survival. The addition of chemotherapy significantly enhances treatment efficacy by targeting rapidly dividing tumor cells, particularly in tumors with high Ki-67 expression. At the same time, targeted therapy, especially anti-HER2 agents such as trastuzumab, plays a crucial role in improving clinical outcomes in HER2-positive patients by inhibiting key oncogenic signaling pathways. Recent advances in oncology have introduced novel therapeutic agents, including CDK4/6 inhibitors and PI3K inhibitors, which have demonstrated promising results in overcoming endocrine resistance and improving survival outcomes. The integration of these agents into clinical practice further emphasizes the importance of personalized treatment strategies.

Conclusions. Luminal B breast cancer is associated with aggressive biological behavior and reduced sensitivity to endocrine therapy alone. The use of combined therapeutic approaches significantly improves treatment response, reduces recurrence rates, and increases both progression-free and overall survival. The identification of molecular characteristics such as Ki-67 and HER2 status is essential for selecting optimal treatment strategies and improving patient outcomes.

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