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QUALITY OF LIFE EVALUATION IN PATIENTS WITH LOCALLY ADVANCED BREAST CANCER (LUMINAL TYPE B) DEPENDING ON ROUTES OF POLYCHEMOTHERAPY ADMINISTRATION

O. V. Bondar

Odesa National Medical University, Odesa, Ukraine

Abstract

Article outlines that patients' with locally advanced breast cancer quality of life is significantly correlated with the chemotherapy method and the level of tumour proliferative activity (Ki-67 index). Patients who received selective intraarterial polychemotherapy had higher quality of life indexes at all stages of treatment, especially with a high level of Ki-67. This is probably due to a faster clinical effect, reduction of tumour size and early achievement of resectability. In contrast, in the group with systemic polychemotherapy with high Ki-67, manifestations of general intoxication, lack of subjective improvement in the early stages of treatment and, accordingly, lower quality of life assessments were more often recorded. Thus, combining quality of life data with tumour molecular biological characteristics (the Ki-67 level) can serve not only as a tool for treatment efficacy evaluation but also as an additional predictor for therapeutic strategy choosing which contributes to the personalization of treatment in oncology. This approach allows to improve the quality of medical care, the efficacy of doctor-patient communication and patients with locally advanced breast cancer treatment final results.

Key words: locally advanced breast cancer; sistemic polychemotherapy; selective intraarterial polychemotherapy; quality of life, treatment.

Modern approaches to breast cancer (BC) treatment have undergone a significant transformation [1]. The radical methods of the past are gradually replaced by personalized, patient-oriented ones [2, 3]. However, the evaluation of therapy efficacy is still largely based on classical statistical indexes - survival, relapse-free period, level of disability, etc [4].

With evidence-based medicine the principles spread the quality of life evaluation importance increased as an integral index that takes into account the physical, emotional, social and cognitive state of the patient. According to ASCO decision, quality of life is more informative criterion of treatment efficacy than relapse-free survival [4, 5].

Despite its subjectivity, quality of life allows us to assess the therapeutic outcome from the patient's perspective which is especially important when choosing further tactics. The main problem is the lack of standardized assessment tools, difficulties in statistical processing, and constant modification of questionnaires [6-8].

Quality of life is widely covered in the world literature, while domestic studies focus mainly on mental disorders. This is especially relevant for patients with locally advanced BC inoperable forms who mostly receive systemic chemotherapy with limited effect and switch to palliative treatment.

Special attention is required for patients with the luminal B subtype of locally advanced BC which is characterized by more aggressive clinical manifestation, higher proliferative activity and altered sensitivity to hormonal therapy compared to the luminal A type [9-11]. In conditions of limited operability and high risk of progression, systemic chemotherapy plays a key role which is often supplemented by selective treatment regimens.

Therapy efficacy monitoring in such cases by single objective clinical and radiological criteria is insufficient [12, 13]. The Ki-67 marker which reflects the proliferative activity of the tumour is increasingly used not only for patient stratification but also as a dynamic tool for monitoring the response to treatment. At the same time, the selected chemotherapeutic tactics impact on the quality of life of such patients remains poorly studied, although it is it that determines the real clinical effect of treatment from the patient's perspective.

Therefore, it is relevant to study quality of life changes in patients with luminal type B of locally advanced BC against the background of both systemic and selective chemotherapy taking into account the dynamics of the Ki-67 level as a marker of therapeutic effect [14, 15]. This

approach allows combining the biological efficacy of intervention with the assessment of functional status and social adaptation which corresponds to the modern paradigm of personalized oncology.

The aim of the work is to determine quality of life indexes in patients with locally advanced breast cancer depending on different methods of polychemotherapy.

Material and methods

The study was based on a retrospective analysis of 71 case histories of patients with locally advanced BC stage T4A-DN0-2M0 of the luminal B subtype. The patients were treated at the Donetsk Regional Anti-Cancer Centre and the University Clinic of Odessa National Medical University during 2000–2017 years. All patients provided written agreement for their examination and treatment results use with scientific purposes.

All patients had inoperable locally advanced BC and received neoadjuvant polychemotherapy (PCT). Depending on the method of chemotherapy drugs administration, two clinical groups were formed:

- Control group (n=25; 35.2%) – patients with systemic PCT;

- Main group (n=46; 64.8%) - selective intraarterial PCT (SIAPCT).

The number of PCT courses varied from 2 to 4 depending on clinical response to treatment. The median age of the patients was equal to 54.2 years (range: 28–74 years), and 78% were women of working age. The main aim of neoadjuvant therapy was to achieve tumour resectability for subsequent radical surgery.

Considering the level of tumour proliferative activity (Ki-67) one could register the following data:

-41 patients (57.7%) demonstrated high level of Ki-67 expression (Ki-67>20%);

-30 patients (42.3%) demonstrated low level of Ki-67 expression (Ki-67≤20%).

Groups randomization was the following:

- Control group: 14 patients (56.0%) — high Ki-67 level, 11 (44.0%) — low;

- Main group: 27 (58.7%) — high Ki-67 level, 19 (41.3%) — low.

Quality of life was estimated according to the EORTC protocol using the validated EORTC QLQ-C30 questionnaire (30 questions). The questionnaire covers general quality of life five functional scales (physical, emotional, social, role, cognitive) and nine symptomatic scales.

The survey was performed in a following way:

1. Before the PCT start (during the first week);

2. 10–14 days after each of the 1^{st} to 4^{th} PCT courses.

The assessment was performed with the help of 0–100 points scale:

- Functional scales: 100 — the best result, 0 — the worst;

- Symptomatic scales: vice versa.

100% of patients in both groups participated in the initial survey. Further surveying was stopped if the tumour was resectable.

Data obtained statistical analysis was performed using “MS Excel” software. Pearson's χ^2-criterion was used to compare qualitative indexes with a statistical significance level of $p<0.05$ ($\chi^2 = 3.841$; df=1). Dynamic changes of indexes studied were assessed through growth rate indexes.

Results

The general condition of the patients before the neoadjuvant PCT start was assessed comprehensively - according to objective criteria (tumour presence, complications in the form of intoxication syndrome, tumour lysis syndrome, secondary infection, etc.) and subjective factors (emotional and psychological state).

Quality of life was determined using the EORTC QLQ-C30 scale which results before the start of therapy did not reveal statistically significant differences between the groups:

– control group (systemic PCT) — 56±10.2 points,

– main group (SIAPCT) — 52±7.1 points ($\chi^2 = 0.23$; $p=0.05$).

After 2 courses of PCT a quality of life decrease was observed in all subgroups, the severity of which depended on the Ki-67 level:

High Ki-67:

- Systemic PCT - a decrease of 12.5%;

- SIAPCT - a decrease of 7.1%.

Low Ki-67:

- Systemic PCT - a decrease of 8.3%;

- SIAPCT - a decrease of 5.6%.

This may indicate a worse tolerability of systemic therapy in patients with high proliferative activity. Three patients in the control group with high Ki-67 levels developed an intoxication syndrome which led to withdrawal from the study.

After 3 courses of PCT, an overall quality of life improvement was observed:

• SIAPCT, high Ki-67 — an increase of 46% (to 72±4.0);

• SIAPCT, low Ki-67 — by 42% (to 66±3.8);

• Systemic PCT, high Ki-67 — by 14% (to 51±3.1);

• Systemic PCT, low Ki-67 — by 17% (to 53±3.4).

The highest improvement was observed in the subgroup of SIAPCT with high Ki-67 which may be associated with a more rapid clinical effect and tumour mass decrease.

After 4 courses of PCT, a quality of life decrease was observed in all subgroups, presumably due to physical exhaustion:

• SIWAPCT, high Ki-67 — 66±3.5 points;

• SIWAPCT, low Ki-67 — 61±3.2 points;

• Systemic PCT, high Ki-67 — 47±3.8 points;

• Systemic PCT, low Ki-67 — 44±3.9 points.

Statistical analysis confirmed the significant SIWAPCT advantage in quality of life improvement over systemic PCT ($\chi^2 = 5.876$; p=0.015; Fig. 1).

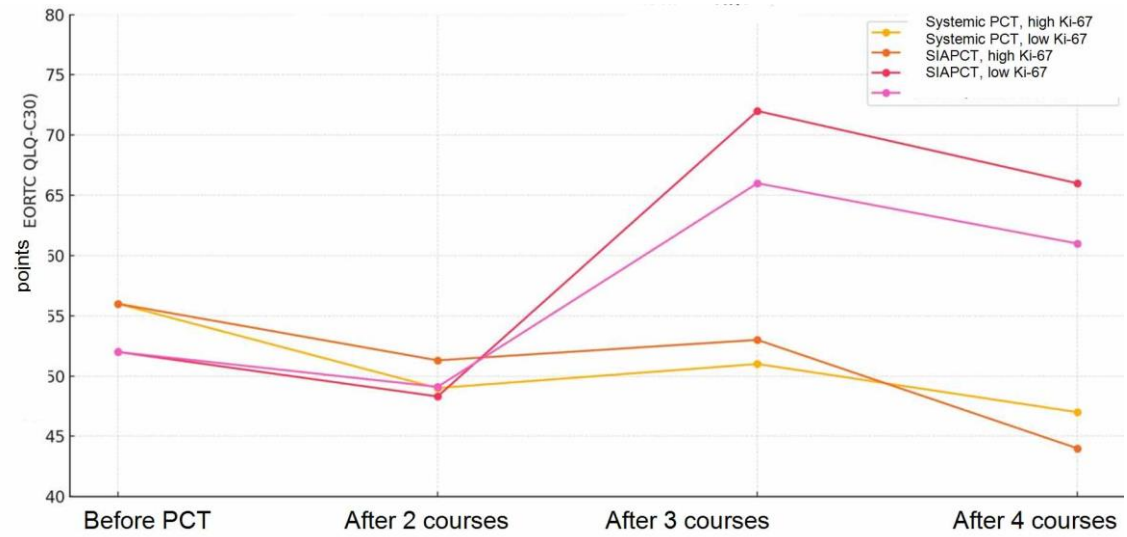

Fig. 1. Quality of life dynamics depending on Ki-67 level

Finally, in the symptomatic panel, we selected for publication only those symptoms that had high reference values, statistical significance, and a pathogenetic relationship with the intervention performed: pain, nausea, and loss of appetite (anorexia) – as parameters characterizing local and general changes in the body (Table 1).

Table 1

Nausea and loss of appetite in both groups patients in treatment dynamics (*the data are presented in points according to EORTC QLQ-C30 scale; the higher is the value, the more intense is the symptom*)

Symptom	Group	Before PCT	After 2 courses	After 3 courses	After 4 courses
Nausea	1	10	63	58	52
	2	10	45	38	30
Anorexia	1	12	65	58	49
	2	12	45	42	38
Pain	1	18	6	3	2
	2	20	7	2	1

Intoxication syndrome, in particular nausea and anorexia, are typical manifestations of side effects of chemotherapy. In group 1 (systemic PCT) after 2 courses the level of nausea reached 63 points, while in group 2 (regional PCT) – only 45 points. A similar trend is observed for anorexia – 65 points in group 1 versus 45 points in group 2 after the second course.

In the future, the indexes gradually decreased: in group 1 to 52 points (nausea) and 49 points (anorexia) after 4 courses; in group 2, respectively, to 30 and 38 points. This confirms the lower toxicity of the regional method.

The pain parameter deserves special attention which is closely related to the local activity of the tumour process. In patients of group 1, its initial level was 18 points, and in group 2, it was 20 points. After treatment, these values decreased to 2–3 points, regardless the PCT type which indicates positive dynamics in terms of local symptoms.

Discussion

Thus, the results of complex quality of life evaluation using the EORTC QLQ-C30 questionnaire indicate a significant role of quality of life and health integral indexes which accumulate the influence of numerous clinical, psychological and social parameters. Analyzing them in the context of dynamics during neoadjuvant chemotherapy, special attention was attracted to components that determine these integrative values.

The average indexes of social well-being in the control group improved from 47±3.7 till 74±4.6 points (total increase of 57.4%), while in the main group - from 51±5.7 till 86±7.4 points (total increase of 68.6%). The dynamics were especially expressed at the stage between the 2nd and the 3rd PCT courses when the increase was +15% and +15.9%, respectively. These differences were accompanied by significant statistical differences between groups (χ^2=4.732, $p<0.05$).

Thus, the most significant predictors of quality of life integral indexes improvement were the parameters of social adaptation and functional status, which, in combination with general physical assessments, create the basis for further clinical effect prediction.

Psychological and emotional changes, although they turned out to be less stable, are still important for patient's condition comprehensive interpretation. Insufficient psychotherapeutic support led to emotional state fluctuations without a clear dependence on the objective results of treatment. This phenomenon emphasizes the need to include professional psychological assistance within the framework of oncological care.

Thus, the quality of life evaluation inclusion in clinical trials of patients with locally advanced BC is an extremely important element that significantly increases both the scientific and practical value of the results obtained.

Conclusions.

Quality of life evaluation proved to be a reliable, informative and cost-effective method that allows to monitor objectively the patients' condition with locally advanced BC not only individually but also at the population level.

The study showed that patients' with locally advanced BC quality of life is significantly correlated with the chemotherapy method and the level of tumour proliferative activity (Ki-67 index). Patients who received selective intraarterial PCT had higher quality of life indexes at all stages of treatment, especially with a high level of Ki-67. This is probably due to a faster clinical effect, reduction of tumour size and early achievement of resectability.

In contrast, in the group with systemic PCT with high Ki-67, manifestations of general intoxication, lack of subjective improvement in the early stages of treatment and, accordingly, lower quality of life assessments were more often recorded.

Thus, combining quality of life data with tumour molecular biological characteristics (especially, the Ki-67 level) can serve not only as a tool for treatment efficacy evaluation but also as an additional predictor for therapeutic strategy choosing which contributes to the personalization of treatment in oncology.

This approach allows to improve the quality of medical care, the efficacy of doctor-patient communication and patients with locally advanced BC treatment final results.

References

1. Bodai BI, Tuso P. Breast cancer survivorship: a comprehensive review of long-term medical issues and lifestyle recommendations. Perm J. 2015; 19(2): 48-79. doi: 10.7812/TPP/14-241.

2. Cheng KKF, Lim YTE, Koh ZM, Tam WWS. Home-based multidimensional survivorship programmes for breast cancer survivors. Cochrane Database Syst Rev. 2017; 8(8): CD011152. doi: 10.1002/14651858.CD011152.pub2.

3. Nekhlyudov L, Ganz PA, Arora NK, Rowland JH. Going Beyond Being Lost in Transition: A Decade of Progress in Cancer Survivorship. J Clin Oncol. 2017; 35(18): 1978–1981. doi: 10.1200/JCO.2016.72.1373

4. Moroz VM, Shandra OA, Vastyanov RS, Yoltukhivsky MV, Omelchenko OD. Physiology. Vinnytsia: Nova Knyha. 2016. 722.

5. Fedorenko ZP, Gulak LO, Mykhailovych YuY, Gorokh EL, Ryzhov AY, Sumkina O, Kutsenko LB. Bulletin of the National Cancer Registry of Ukraine. 2019; 20: 117. [In Ukrainian]

6. Garg PK, Prakash G. Current definition of locally advanced breast cancer. Curr Oncol. 2015; 22(5): 409-410. doi: 10.3747/co.22.2697.

7. Harbeck N, Penault-Llorca F, Cortes J, Gnant M et al. Breast cancer. Nat Rev Dis Primers. 2019; 5(1): 66. doi: 10.1038/s41572-019-0111-2.

8. Thill M, Kolberg-Liedtke C, Albert US, Banys-Paluchowski M, Bauerfeind I, Blohmer JU et al. AGO Recommendations for the Diagnosis and Treatment of Patients with Locally Advanced and Metastatic Breast Cancer: Update 2023. Breast Care (Basel). 2023; 18(4): 306-315. doi: 10.1159/000531579.

9. Anampa J, Makower D, Sparano JA. Progress in adjuvant chemotherapy for breast cancer: an overview. BMC Med. 2015; 13: 195. doi: 10.1186/s12916-015-0439-8.

10. Barton MK. Mastectomy and breast-conserving therapy confer equivalent outcomes in young women with early-stage breast cancer. CA Cancer J Clin. 2015; 65(5): 335-336. doi: 10.3322/caac.21289.

11. Heil J, Kuerer HM, Pfob A, Rauch G, Sinn HP, Golatta M. et al. Eliminating the breast cancer surgery paradigm after neoadjuvant systemic therapy: current evidence and future challenges. Ann Oncol. 2020; 31(1): 61-71. doi: 10.1016/j.annonc.2019.10.012.

12. Chen L, Kong X, Wang Z, Wang X, Fang Y, Wang J. Pre-treatment systemic immune-inflammation index is a useful prognostic indicator in patients with breast cancer undergoing neoadjuvant chemotherapy. J Cell Mol Med. 2020; 24(5): 2993-3021. doi: 10.1111/jcmm.14934.

13. Mateo AM, Mazor AM, DeMora L, Sigurdson ER, Handorf EA, Daly JM. et al. Patterns of Care and Efficacy of Chemotherapy and Radiotherapy in Skin-Involved Breast Cancers of All Sizes. Clin Breast Cancer. 2019; 19(4): 292-303. doi: 10.1016/j.clbc.2019.02.003

14. Mihai D, Voiculescu S, Cristian D, Constantinescu F, Popa E, Burcos T. Multimodal treatment of aggressive forms of breast cancer. J Med Life. 2015; 7(3): 415–420.

15. Sarosiek T. Systemic treatment of early breast cancer - current state of knowledge after the conference St Gallen 2017. Pol Merkur Lekarski. 2017; 43(257): 232-236.

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Informed Consent Statement

The retrospective analysis of material was used. Written informed consent from the patients was not necessary to publish this paper.

Data Availability Statement

The data presented in this study are available on request from the author.