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## The influence of radiation the quality of life assessment in patients with metastatic brain lesions

**Relevance:** *Metastatic brain lesion (MBL) is a serious complication of the course of cancer. The advances in medicinal treatment have increased patients' overall survival and, thereby, the MBL frequency. On the other hand, opportunities for the treatment of patients with MBL are expanding. Microsurgical techniques, stereotactic radiation therapy, and radiosurgery are actively implemented. Effective therapy and local control of MBL are of paramount importance for the prognosis and quality of life (QOL) of patients.*

This study aimed to investigate the influence of radiation therapy on quality of life assessment in patients with metastatic brain lesions.

**Results:** *The QOL analysis of patients with MBL showed that QOL mainly depends on the localization, histo-biological properties of the tumor, the severity of preoperative neurological deficit, as well as age and gender. MBL control may be important for maintaining the patient's QOL but does not always affect survival, which is determined by the activity and prevalence of the disease.*

**Conclusion:** *The QOL of patients with MBL is the defining criterion for assessing their condition and the effect of the therapy. This is because the limitations of the normal existence of the patient arising from a chronic disease are often more important to the patient than the symptoms of the disease.*

**Keywords:** oncology, quality of life (QOL), RT (RT), metastatic brain lesion (MBL).

**Introduction:** New antitumor treatment programs based on the recent advances in anticancer medicine and innovative radiation therapy (RT) methods have significantly increased cancer patients' survival. However, secondary hematogenous brain damage is among the factors that complicate the course of cancer.

A relatively low quality of life (QOL) and a short life expectancy of such patients require an effective treatment using RT. Adequate therapy selection for this group of patients is pertinent and designed to increase their life expectancy while maintaining the QOL.

Factors that influence the disease course include age, tumor histological structure, the number of secondary foci, the patient's general health status, neurological symptoms, extracranial progression, and the previous treatment. As a result, treatment options for this pathology are numerous. Their effectiveness is constantly being investigated, but there is still no consensus on this matter [1]. RT, particularly stereotactic radiosurgery and hypofractionation RT, plays an essential role in the modern treatment of metastatic brain lesions (MBL) [2]. These techniques are used to escalate the focal dose before or after the entire brain irradiation in single or multiple metastases or independently [3].

Treatment of MBL requires a multidisciplinary approach. The treatment recommendations should be based on the patient's status (functional status, age, intracranial and extracranial prevalence of the disease) and gene alterations in the tumor [4].

The study of QOL is a relatively new area of clinical research. However, it attracts raising attention and can sometimes serve as the main criterion for clinical efficacy. QOL is deemed one of the key parameters in studying the final treatment outcome [5].

Brain tumors and their specific treatment bring about many undesirable consequences like cosmetic defects, severe mental trauma. Besides the survival issue, the patients are concerned about possible disability due to their body functions' impairment [6-9].

Personal assessment of treatment outcome, widely used in general oncology, is not suitable for a neurological pathology since such a pathology involves the brain, which determines human mental activity. Unfortunately, an optimal result – saving and prolonging life without deteriorating its quality – is not always possible [10].

Therefore, the QOL concept has recently become particularly pertinent, and the transition to quantitative characteristics is needed.

The QOL analysis before and during therapy will provide extremely valuable multidimensional data about individual responses to the disease and administered therapy. In such a serious disease as cancer, some QOL parameters become a decisive factor that can be identified and measured [9].

The lack of randomized multicenter studies and sufficient clinical experience of simultaneous use of total and local irradiation in Kazakhstan remains the reason for uncertain expert views on the optimal RT tactics. The relevance of the above and the need for further optimization of RT for MBL has determined the topic of this research aimed to increase treatment efficacy and improve the QOL of patients with MBL by optimizing the RT protocols.

*This study aimed to investigate the influence of radiation therapy on quality of life assessment in patients with metastatic brain lesions.*

**Materials and Methods:** The study involved 60 patients with BML who received RT at the Kazakh Institute of Oncology and Radiology (Almaty, Kazakhstan). 57% of

them were men, 43% – women. The average age of the patients was 45.6 + 5.1 years (P <0.05).

The QOL of patients with BML was studied using the Karnofsky scale [11] and the QOL questionnaire SF-36 [12]. The QOL was comparatively analyzed over time: after hospitalization and after RT treatment (in the early rehabilitation period). The prerequisite was determining the QOL of patients by assessing their general condition before and after RT (before discharge).

In all observations, the most important in assessing the treatment outcome was identifying the dynamics in QOL in operated patients. That substantiated the development of QOL criteria, with an assessment of socio-psychological adaptation in terms of physical condition, psychological well-being, social relationships, and functional abilities.

**Results and discussion:** 60 MBL cases were studied. An average QOL score by the Karnofsky scale was 45 points at admission and 74 points at the end of RT.

Our research revealed statistically significant positive changes in QOL indicators in BML after anticancer RT com-

pared to the pre-treatment indicators in physical functioning, role functioning, mental health, general health, and viability (Table 1).

**Table 1 – The QOL indicators in patients with metastatic brain lesions**

Indicator (score)	Before treatment	After treatment
Physical functioning (PF)	63.13±0.4	57.00±0.4
Role performance (RP)	70.65±0.2	55.63±0.1
Pain (BP)	67.18±0.3	74.60±0.2
General health (GH)	72.13±0.2	61.68±0.2
Vitality (VT)	73.68±0.4	65.75±0.3
Social functioning (SF)	48.16±0.2	51.75±0.1
Emotional functioning (RE)	35.23±0.1	50.41±0.1
Mental health (MH)	69.20±0.3	58.80±0.4

The research revealed an improvement or stabilization of the integral QOL indicator and a decrease in the severity of actual symptoms in most patients, as well as the number of patients who experienced significantly pronounced symptoms (Figure 1).

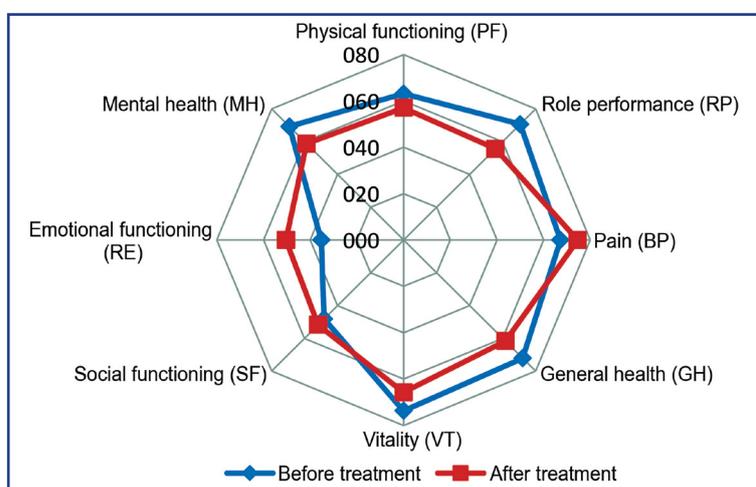


Figure 1 – The dynamics of quality of life rates for patients with brain metastases injury

It should also be noted that this study examined the individual QOL-related response to treatment. The change in QOL indicators was analyzed for each patient separately (Figure 2).

Evaluation of QOL and symptoms of patients with BM makes it possible to provide a holistic, comprehensive assessment of the treatment outcome for this category of patients.

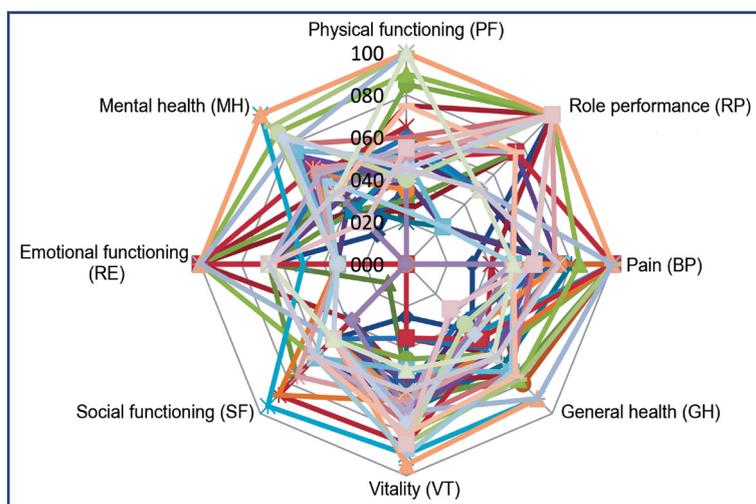


Figure 2 – QOL profiles of patients with metastatic brain lesions

**Conclusion:** The QOL assessment by the patient himself is an important and reliable indicator of his general condition. It provides medical personnel with a unique opportunity to look at the disease through the patient's eyes and ascertain the changes induced by complex treatment. Along with the standard medical conclusion, these data allow forming a holistic and objective picture of the patient's condition.

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