

Quality of life and relation to disease in patients with bone sarcoma

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The study aimed to investigate the basic aspects of quality of life and relation to disease in patients with malignant or premalignant bone tumors. Study participants (N=82) were aged 18 to 67 years (average age 34 ± 2 years). They were separated into three groups depending on diagnosis: patients with osteosarcoma, patients with giant cell tumor and patients with chondrosarcoma. The SF-36 Health Status Survey and the Quality of Life Questionnaire - Core 30 with Bone Metastasis (BM22) Module were used to assess patient quality of life. The type of relation to disease method (TOBOL) was used to determine the relation to disease of the patients.

According to the results of the quality of life study, patients with giant cell tumor exhibited the highest degree of limiting physical activity and reduced social functioning, the greatest financial difficulties and more pain sites than either patients with osteosarcoma or patients with chondrosarcoma. The study of relation to disease revealed that all studied groups of patients were susceptible to ergopathic and sensitive types of relation to disease. Moreover, patients with giant cell tumor experienced increased levels of tension and irritability with respect to relation to disease and treatment, while patients with chondrosarcoma were more susceptible to anxiety and hypochondria with respect to relation to disease.

Patients with different types of bone tumors have different experiences with respect to their physical and mental health, their social functioning and their general health. The results of the study may be useful in developing individualized psychological aid programs for patients with malignant and premalignant bone tumors.

Keywords: bone sarcoma, malignant bone tumor, quality of life, relation to disease

Introduction

Over the last few decades, the world has experienced rapid growth in scientific research regarding health-related quality of life (Kasimova & Giryaeva, 2009). Quality of life is a complex system construct that includes a series of interconnected aspects, including safety of physical functions and the extent of physical suffering;

psychological status, which includes the feeling of independence and satisfaction of life at a given moment; possibility of professional activity; quality of social contacts and other aspects. Thus, all basic aspects of personal functioning — physical, psychological (spiritual), social — in the system (integrating and interacting) are presented in the quality of life concept (Wasserman et al., 2011; WHOQOL Group..., 1996). Changes in these basic aspects of personal functioning clearly manifest themselves in oncological patients, and moreover, the nosologic form of the disease significantly influences differences in the indices. The quality of life survey allows for describing and measuring the multiple disturbances that occur in oncological patients during the process of oncological tumor growth (Novik & Ionova, 2002).

There is no doubt that a malignant bone tumor dramatically changes patients' quality of life, as the development of the bone tumor is accompanied by pain and, on some occasions, by bone fractures in the place of pathological process localization. Furthermore, the tumor development affects the mobility of the affected limb, which leads to a sharp decline in the possible physical loads of the patient, including the possibility of long periods of being confined to bed. Bone sarcoma and giant cell tumor treatment, in most cases, require surgical resection of the affected part of the bone and substitution of the defect with endoprosthesis. Thus, the patient experiences a lifelong severe limitation in physical activity. Less frequently, the treatment requires limb amputation, which leads to permanent disability. The treatment for patients with malignant bone tumors compromises every day competence, body image, work and social opportunities. As a consequence, it is important to consider the psychological, functional and quality of life outcomes (Yong-Jian et al., 2012; Eiser et al., 2001). Thus, the significant impact of bone sarcoma on physical activity and social functioning of patients highlights the relevancy of patient quality of life. The study of quality of life in patients with osteosarcoma is especially important given the young age of the patients (up to 35 years) and the aggressiveness of this type of tumor, as it requires that the treatment include both preoperative and postoperative chemotherapy (Agaev, 2005). In addition to the difficulties experienced by survivors of any cancer, those treated for a bone tumor may experience additional threats to quality of life as a consequence of restricted mobility, pain and stigmatization (Eiser & Grimer, 1999).

Relation to disease has the same importance in the treatment and rehabilitation of oncological patients; it is an important component of the internal image of the disease (Luriya, 1977). Relation to disease largely determines the compliance level of the patient, which is a significant factor in treatment efficacy and patient survival (Danilov, 2008; Tkhostov & Nelyubina, 2011; Ngoh, 2009).

The aim of this study was to investigate the basic aspects of quality of life and the relation to disease in patients with malignant bone tumors.

The goals of the study were to conduct a 1) comparative analysis of subjective valuation of general health and psychological and social functioning in patients with different nosological types of malignant bone tumors, 2) comparative analysis of the severity of specific symptoms and the quality of life in patients with malignant bone tumors, and 3) comparative analysis of relation to disease in patients with different nosological types of malignant bone tumors.

Method

Experimental group characteristics and experimental methods

Study participants (N=82) were inpatients of N.N. Blokhin Russian Cancer Research Center RAMS, Surgery Department of General Oncology. The patients were aged 18 to 67 years old (average age 34 ± 2). There were 47 (57%) males and 35 (43%) females in the general group. According to the research goals, the general group was split into three groups based on diagnosis. The first group, (A), included 39 patients diagnosed with osteosarcoma, stage IIB, average age 27 ± 2 years. There were 23 (59%) males and 16 (41%) females in this group. The second group, (B), included 22 patients with giant cell tumor, average age 36 ± 3 years. There were 8 (36%) males and 14 (64%) females in this group. The third group, (C), included 21 patients diagnosed with chondrosarcoma G1, G2, average age 46 ± 3 years. There were 17 (81%) males and 4 (19%) females in this group.

Statistical analysis of study results

Statistical significance of distinctions between groups was calculated using the t-criterion student test, and Microsoft Excel 2007 was used for processing the results.

Methods description

The methods employed included the administration of the SF-36 Health Status Survey (Ware et al., 1993; Wasserman et al., 2011), the Quality of Life Questionnaire - Core 30 of the European Organization for Research and Treatment Cancer (Aaronson et al., 1993; Fayers et al., 1995); the specific module BM-22 (bone metastasis) designed for quality of life evaluation in patients with malignant bone tumors (Nenarokomov, 2012); and the type of relation to disease (TOBOL) (Psychological diagnostic..., 2005).

The SF-36 questionnaire was designed for studying the basic aspects of the HRQoL and the limitations imposed on patients with chronic diseases. The questionnaire includes 11 sections and 11 items. The results are presented for 8 scales: general health, physical functioning, role-physical, role-emotional, social functioning, bodily pain, vitality and mental health. The scores range from 0 to 100.

This method is widely used in scientific research of patients with somatic diseases, including those presenting vital threats (Novik & Ionova, 2002; Wasserman et al., 2011). An example is the EORTC QLQ-C30, which is a highly sensitive tool for evaluating quality of life in patients with oncological diseases apart from its type (Ionova, Novik & Suhonos, 1998). The EORTC QLQ-C30 consists of 30 items that assess global health status, 5 functional scales — specifically, physical functioning, role functioning, emotional functioning, cognitive functioning, social functioning — and 9 symptom items — fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea and financial difficulties. The scores range from 0 to 100.

The EORTC QLQ-C30 includes different modules for specific nosological types of cancer. One of these modules is the BM22, which is used to study specific symptoms that reflect quality of life in patients with malignant bone tumors. The

module consists of 20 questions and has 2 symptom scales — painful sites and pain characteristics — and 2 functional scales — functional interference and psychosocial aspects. The scores range from 0 to 100.

The type of relation to disease (TOBOL) consists of 12 parts, and each part consists of 2 items. The method determines the relation to disease in patients. There are 12 types of relation to disease: realistic, ergopathic, denial, anxious, hypochondriac, neurotic, melancholy, apathetic, sensitive, egocentric, paranoid, aggressive.

Results and discussion

According to the goals of the research, in the first phase, the characteristics of health-related quality of life in patients with bone sarcoma were studied. The results of the comparative research of the three groups of patients are presented in table 1 (statistical characteristics based on the SF-36 questionnaire scales).

Table 1. Health-related quality of life indices in patients with bone sarcoma

SF-36 Health Status Survey Scales	Patients with Osteosarcoma (n=38) A M ± m	Patients with Giant Cell Tumor (n=22) B M ± m	Patients with Chondrosarcoma (n=21) C M ± m	Reliable Differences
General Health (GH)	60.5 ± 3.29	57 ± 3.14	59.14 ± 4.82	
Physical Functioning (PF)	49.34 ± 4.22	37.27 ± 5.98	57.62 ± 8.2	AB* BC**
Role-Physical (RP)	34.21 ± 6.37	22.73 ± 8.23	42.86 ± 10.46	
Role-Emotional (RE)	50.0 ± 7.07	48.48 ± 9.71	57.14 ± 9.76	
Social Functioning (SF)	67.11 ± 4.49	60.23 ± 5.87	69.05 ± 6.71	
Bodily Pain (BP)	53.84 ± 4.87	50.77 ± 6.57	50.95 ± 6.66	
Vitality (VT)	62.89 ± 3.66	58.86 ± 3.5	62.62 ± 5.88	
Mental Health (MH)	65.68 ± 3.44	58.55 ± 3.08	62.48 ± 4.95	AB*

Note. In this and subsequent tables, * — corresponds to the level of statistical significance $0.05 < p < 0.1$; ** — $p < 0.05$; *** — $p < 0.01$.

According to the SF-36, large values on scoring assessments correspond to better quality of life characteristics. For instance, high scores on the “Bodily Pain” scale indicate that the pain syndrome only slightly limits vital activity and social functioning of the patient. The maximum score for all scales is 100.

The results presented in table 1 show statistically significant differences between groups of patients with respect to physical functioning, as patients with giant cell tumor have the highest degree of limiting physical activity when compared to patients with osteosarcoma and patients with chondrosarcoma. There were also differences found between patients with osteosarcoma and patients with giant cell tumor with respect to mental health, as patients diagnosed with giant cell tumor were more susceptible to depression and anxiety. They were also less satisfied with their emotional state and cognitive functioning than were patients with osteosarcoma.

There were no statistically significant differences between patients with osteosarcoma and patients with chondrosarcoma, as evidenced by the results from the

quality of life study presented in table 2. These results were obtained using the QLQ C-30 designed for studying oncological patients and the specific module BM-22, which was specially designed for studying patients with malignant bone tumors.

Table 2. Quality of life indices related to severe defeat of locomotor apparatus (bone sarcoma)

EORTC QLQ C-30 Scales	Patients with Osteosarcoma (n=39) A M ± m	Patients with Giant Cell Tumor (n=22) B M ± m	Patients with Chondrosarcoma (n= 19) C M ± m	Reliable Differences
Global Health Status (QL2)	57.69 ± 3.46	45.08 ± 5.37	54.39 ± 8.03	AB**
Physical Functioning (PF2)	66.67 ± 3.79	60.61 ± 4.10	71.58 ± 6.26	
Role Functioning (RF2)	58.55 ± 5.47	50.0 ± 6.92	64.91 ± 8.87	
Emotional Functioning (EF)	69.87 ± 3.83	65.15 ± 5.37	71.05 ± 5.94	
Cognitive Functioning (CF)	85.47 ± 3.29	81.82 ± 4.48	82.46 ± 5.63	
Social Functioning (SF)	66.67 ± 5.62	52.27 ± 6.07	78.07 ± 6.55	AB* BC***
Fatigue (FA)	40.17 ± 4.1	41.92 ± 4.79	41.52 ± 7.14	
Nausea and Vomiting (NV)	7.69 ± 2.76	3.79 ± 1.92	2.63 ± 2.70	
Pain (PA)	37.6 ± 5.03	51.52 ± 7.27	47.37 ± 8.2	
Dyspnea (DY)	19.66 ± 4.76	15.15 ± 5.37	17.54 ± 7.58	
Insomnia (SL)	31.62 ± 5.1	30.30 ± 6.7	40.35 ± 9.29	
Appetite loss(AP)	23.93 ± 4.63	31.82 ± 6.14	19.29 ± 7.99	
Constipation (CO)	11.97 ± 4.2	12.12 ± 4.23	17.54 ± 6.61	
Diarrhea (DI)	4.27 ± 1.83	4.55 ± 3.4	8.77 ± 4.42	
Financial Difficulties (FI)	54.7 ± 5.48	69.7 ± 7.07	43.85 ± 7.43	AB* BC**
QLQ-BM22 scales				
Pain Sites (BMPS)	18.12 ± 2.05	26.67 ± 4.27	17.4 ± 4.23	AB* BC*
Pain Characteristics (BMPC)	23.93 ± 4.72	32.28 ± 5.77	32.1 ± 7.03	
Functional Interference (BMFI)	68.16 ± 4.35	60.71 ± 4.1	65.51 ± 7.03	
PsychosocialAspects(BMPA)	46.72 ± 3.57	40.21 ± 4.02	50.62 ± 4.69	BC*

According the EORTC QLQ C-30 for functional scales and the general health scale, the best health status of patients corresponds to 100, while the worst health status corresponds to 0. For all symptom scales, the best health status corresponds to 0, while the worst health status corresponds to 100 (Fayers P. at al., 1995).

The results presented in table 2 indicate that patients with osteosarcoma evaluate their general health as higher than patients with giant cell tumor. These data are consistent with the results of the health-related quality of life study using the SF-36.

Patients with giant cell tumor undergo only surgical procedures, and moreover, this disease is not malignant. In contrast, patients with osteosarcoma generally require both preoperative and postoperative chemotherapy, as this is an aggressive

malignant tumor. This discrepancy is addressed when considering the psychological aspects of quality of life parameters, which are subjectively evaluated by the patients. Despite the more severe treatment and the malignancy of the tumor, and contrary to the clinical characteristics, patients with osteosarcoma perceive their general health as better when compared to patients with giant cell tumor.

The data also indicate differences between the groups with respect to social functioning. Patients with osteosarcoma and chondrosarcoma were susceptible to an increased level of social activity than were patients with giant cell tumor. Accordingly, these data characterize that the quality of life in patients with bone sarcoma, with respect to social functioning, was higher than it was for patients with premalignant tumors.

A statistical analysis of the data further revealed differences between patients with osteosarcoma and chondrosarcoma and patients with giant cell tumor regarding financial difficulties such that patients with giant cell tumor faced greater financial difficulties due to the disease and the required treatment compared to patients with bone sarcoma. Additionally, the quality of life for patients with giant cell tumor was found to be lower than the quality of life for patients with osteosarcoma and chondrosarcoma based on the scores reported on the pain sites scale. More specifically, patients with giant cell tumor characterized their pain as more widespread than did patients with bone sarcoma. Despite this finding, patients with giant cell tumor experienced fewer difficulties with respect to the psychosocial aspects of life compared to those of patients with chondrosarcoma.

There were no statistically significant differences regarding the quality of life parameters between the groups of patients with osteosarcoma and the patients with chondrosarcoma.

Quality of life is largely based on the individual's attitude toward health as a vital value. Therefore, the understanding and awareness of this value are important when evaluating an individual's disease. Based on Myasishev's theory of personality, quality of life may be interpreted as the manifestation of the intercommunication "system of relations — disease" (Iovlev & Karpova, 1999). Thus, the psychological mechanisms of disease impact the personality and the personal well-being of the patient and must be considered based on the position of the personality relations system and the subjective meaning of disease as an event in one's life (Vasserman et al., 2011). One of the most significant areas of personality relations of individuals with severe chronic diseases is that of the patient's relation to disease. Thus, the next phase of this research examined the types of relations to disease in patients with malignant bone tumors.

The study employed the types of relations to disease method (TOBOL) in the three groups of patients as presented in table 3.

Table 3 indicates that patients with malignant bone tumors are more susceptible to ergopathic and sensitive reactions toward their disease, as all three groups of patients were inclined to exhibit excessive responsibility behaviors toward work, a desire to maintain their professional status and the intent to maintain the level of professional activity even at the expense of their physical well-being due to the detrimental effects on their treatment. Moreover, these patients are excessively vulnerable and are concerned about how others perceive their disease. For example, patients with bone malignant bone tumors are afraid that they will be a burden on their relatives, fearing an unfriendly relationship.

Table 3. Relation to disease in patients with bone sarcoma

Type of Relation to Disease (TOBOL Scales)	Patients with Osteosarcoma (n=39) A M± m	Patients with Giant Cell Tumor (n=21) B M± m	Patients with Chondrosarcoma (n= 21) C M± m	Reliable Differences
Harmonic	12.33 ± 2.07	11.19 ± 1.64	13.8 ± 3.03	
Ergopathic	25.85 ± 1.72	26.57 ± 2.14	24.43 ± 2.9	
Anosognosic	12.46 ± 2.57	7.57 ± 2.8	7.67 ± 2.93	
Anxious	9.28 ± 1.96	15.57 ± 2.07	14.19 ± 2.51	AB** AC*
Hypochondric	9.82 ± 1.18	10.1 ± 2.36	13.24 ± 1.78	AC*
Neurasthenic	7.49 ± 0.99	10.43 ± 1.67	8.05 ± 1.15	
Melancholic	3.92 ± 0.71	4.48 ± 1.56	5.05 ± 1.46	
Apathetic	4.1 ± 0.76	4.43 ± 1.15	4.86 ± 0.9	
Sensitive	19.18 ± 1.54	21.38 ± 1.73	19.71 ± 2.3	
Ego-centric	8.15 ± 0.8	12 ± 1.47	10.19 ± 1.12	AB**
Paranoiac	5.13 ± 0.74	7.62 ± 1.27	4.9 ± 1.06	AB* BC*
Dysphoric	3.3 ± 0.72	5.95 ± 1.65	2.19 ± 0.76	BC**

There are statistically significant differences between the groups of patients with respect to the level of patient anxiety regarding their disease. Patients with osteosarcoma are less susceptible to anxious responses to disease than are patients with giant cell tumor or patients with chondrosarcoma. In fact, patients with giant cell tumor and patients with chondrosarcoma are inclined to experience constant anxiety and suspicion regarding the adverse course of the disease, and therefore, they search for new ways to treat their anxiety.

A statistical analysis of the data further shows that patients with chondrosarcoma are more susceptible to a hypochondriac relation to disease than are patients with osteosarcoma. Consequently, patients with chondrosarcoma are more inclined to focus excessively on painful sensations, to exaggerate their suffering and to feel compelled to tell their doctors about their painful sensations. It was also determined that patients with giant cell tumor are more inclined to experience an egocentric type of relation with their disease than are patients with osteosarcoma. Thus, patients with giant cell tumor are more inclined to search for “secondary benefits” due to their illness and tend to require constant attention and care, with the intent being to demonstrate their suffering.

Furthermore, the results of the study indicate a greater tendency among patients with giant cell tumor to exhibit a paranoiac relation to disease than among patients with osteosarcoma and chondrosarcoma. The patients with giant cell tumor are more inclined to be suspicious with regard to methods of treatment and exhibit a greater tendency to attribute complications and side effects to the negligence of doctors. Additionally, the data suggest that patients with giant cell tumor are more susceptible to a dysphoric (aggressive) type of relation with their disease than are patients with chondrosarcoma. Thus, it is more common for patients with

giant cell tumor to experience dark moods, be envious of healthy persons and to display aggressive tendencies or despotic attitudes toward family.

Among these orientations for all studied groups of patients, ergopathic and sensitive types of relation to disease can be attributed to a clearly defensive nature. The ergopathic type of relation to disease is one of the most adjustable types (Psychological diagnostics..., 2005) and thus represents a sufficient level of motivation and social orientation of behavior. In this regard, it is further noted that the data are consistent with the study results of Morrissy and Weinstein (2006). Their study, which was devoted to the assessment of the quality of life of patients with osteosarcoma who also had rotationplasty, demonstrated that although the patients' physical function was less than in healthy peers, psychological adaptation and life contentment were relatively the same between the two groups.

In the group of patients with giant cell tumor, the study reveals a reduced quality of life with respect to several parameters, namely physical functioning, social functioning, financial difficulties and pain sites, when compared with the groups of patients with osteosarcoma and chondrosarcoma. Furthermore, the study reveals that patients with giant cell tumor exhibit a tense and irritable relationship with both disease and treatment. These results correspond to the results of a longitudinal study conducted by Chinese researchers in which it was found that a year after terminating treatment, patients with bone tumors still suffered from a declining quality of life compared with their healthy peers. Specifically, quality of life parameters for these patients were lower on all scales of the SF-36 Health Status Survey (Yong-Jian et al., 2012). Nonetheless, according to the study's data, this group of patients is not the most unsuccessful in the psychosocial aspects of life.

This study concludes that patients with chondrosarcoma are more susceptible to anxiety related to disease and to hypochondriac fixation compared to the other groups of patients.

Conclusion

Despite the similarities of the clinical picture, its dynamics and its prognoses, patients with different types of bone tumors have different experiences according to their situation and relation with the disease, and thus, they evaluate their physical and mental health, social functioning and general health in different ways. Our data are consistent with previous works, thereby suggesting that the outcomes for patients with different types of tumor or at different stages of the disease and treatment may vary (Eiser & Grimer, 1999; Eiser et al., 2001; Yong-Jian et al., 2012).

The results of this study define the need for the development of individualized psychological aid programs for patients with malignant and premalignant bone tumors. Moreover, different nosological forms of bone tumors are typical for different age periods, each of which seems to have its own standards of quality of life.

A new interdisciplinary branch of clinical and research medicine, psychology and psychotherapy — psycho-oncology — has been formed (Holland et al., 1995). This new branch of psychosomatic medicine and new field of medical psychology — onco-psychology (Tarabrina, 2010) — studies the psychological effects of cancer incidence and progression as well as problems related to personality adjustment to the disease and issues associated with promoting acceptable patient quality

of life. Though oncology in this sense is close to other fields of physical medicine, psycho-oncology has distinctive features related to particularly severe stress factors such as malignant neoplasms, emotional reactions to diagnoses, the high frequency of the adverse courses of the disease, vital threats, and serious complications during treatment.

Individual sense and significance of the diagnosis largely determine patient behavior during treatment, motivation to cure and individual satisfaction with quality of life under the conditions of the disease (Wasserman et al., 2011). Levin and Kissane (2007) explain that self-awareness, freedom and responsibility to make vital decisions, complete loneliness and human need for communication, meaning of life and inevitable reality of death are topics addressed by psycho-oncology. The modern level of psycho-oncology development involves the differentiated study of psychosocial factors and quality of life in patients with malignant tumors in various sites of the body. As this study of the main aspects of quality of life and relation to disease in patients with malignant bone tumors is one of the first, it consequently outlines some general landmarks of psychological support and rehabilitation of patients.

The issue of quality of life in patients with malignant bone tumors requires further research. A possible direction of this research may include a comparative analysis of the quality of life in patients with primary bone tumors compared to patients with bone metastases. Further research may also direct attention to the application of the results of the quality of life study in routine clinical practice.

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