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Original Article

Pain care nursing ameliorates the psychological burden and improves the efficacy in combined treatment of radiotherapy and zoledronic acid for bone metastasis of malignant tumor

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Abstract: Objective: To explore the role of pain care nursing in ameliorating psychological burden and improving the efficacy in combined treatment of radiotherapy and zoledronic acid for bone metastasis of malignant tumor. Methods: One hundred thirty-seven patients with bone metastasis of malignant tumor were enrolled as study subjects. All patients received zoledronic acid combined with radiotherapy for the treatment of bone pain. They were randomly divided into a control group with 62 patients who underwent the regular nursing procedure, and an observation group with 75 patients who underwent the regular nursing procedure combined with the pain care nursing. Following treatment, we compared the efficacy using the ostealgia scale of the World Health Organization (WHO), anxiety using a self-rating anxiety scale, depression using a self-rating depression scale, life quality using quality of life score (SF-36) and satisfaction degree toward nursing care using the Newcastle Satisfaction with nursing scale (NSNS). Results: The rate of patients with 0-degree ostealgia in the observation group remained higher than that in the control group ($p<0.05$), and the rate of patients with 1-degree in the observation group was lower than that in the control group ($p<0.05$). After treatment, anxiety and depression scores in the observation group were much lower than those in the control group ($p<0.05$); In addition, the life quality scores in these two groups were also clearly ameliorated ($p<0.05$), but the life quality score in the observation group was much higher than that in the control group ($p<0.05$). Moreover, satisfaction degree toward nursing in the observation group was much better than that in the control group ($p<0.05$). Conclusion: For patients with bone metastasis of malignant tumors, pain care nursing can improve the efficacy of combined treatment of radiotherapy and zoledronic acid, ameliorate the anxiety and depression, improve the life quality and the satisfaction degree toward nursing.

Keywords: Pain care nursing, radiotherapy, zoledronic acid, psychology, treatment

Introduction

The incidence rate of malignancy keeps increasing, and accumulating evidence suggests that in the advanced stage, malignant tumors migrate to other tissues and organs, further exacerbating the disease [1, 2]. Bone tissue is more susceptible to the tumor metastasis, usually manifesting as features of ostealgia and functional loss, and the patients are more vulnerable to fracture and myelosuppression, severely affecting the psychological status and life quality of patients [3].

Radiotherapy is the major method of treatment in bone metastasis in malignant tumors, but recent studies have found that with the increase intolerance of tumors to the radiotherapy, plus the severe adverse reactions, the life quality of patients has been severely affected; thus, simple application of radiotherapy usually gains poor efficacy on the bone metastasis in malignant tumors [4, 5]. Clinical studies have shown that zoledronic acid in combination with radiotherapy can mitigate the ostealgia in patients with bone metastasis in malignant tumors to reduce the bone loss [6, 7]. However, to further

improve the efficacy, we believe that rational and effective nursing care might be an efficient way, and according to the previous studies, nursing care can enhance the efficacy of zoledronic acid more efficiently [8, 9]. Pain care nursing is a kind of systemic and individualized nursing procedure that is summarized by literature retrieval, previous studies and evidence-based medicine, and it can ameliorate the pain, sleep, anxiety and depression of patients, while promoting the functional recovery of patients [10, 11]. Pain care nursing has been widely applied in radiotherapy for patients with malignant tumors, or tumor metastasis [12, 13], but there remain few studies reporting the efficacy of pain nursing in the combined treatment of radiotherapy and zoledronic acid.

In this study, we analyzed the efficacy of pain care nursing in the combined treatment of zoledronic acid and radiotherapy for patients with bone metastasis in malignant tumors, to figure out the effect of pain care nursing on the efficacy of this combined strategy.

Materials and methods

Subjects

One hundred thirty-seven patients aged between 27 and 63 years old with bone metastasis of malignant tumors who were admitted to this hospital for combined treatment of radiotherapy and zoledronic acid between March 2015 and April 2017 were included. They were randomly divided; 62 underwent regular nursing procedures (control group), and 75 patients underwent regular nursing procedures combined with the pain care nursing (observation group). According to the pathological diagnosis, there were 26 patients with lung cancer, 43 with breast cancer, 7 with rectal cancer, 2 with renal cancer, 25 with gastric cancer, 22 with liver cancer and 12 with ovarian cancer. The imaging examination showed that there were 89 patients with single bone metastasis, and 48 with multiple bone metastases. All patients had no history of tumors, and received surgery and chemotherapy for the first time in this hospital, without allergic reactions to zoledronic acid. Besides, patients showed no abnormal hemorrhage or anomaly in coagulation function, and had perfect clinical data and follow-up data. Patients complicated with other tumors, severe cancer pain, hypertension, heart attack, diabetes mellitus, acute kidney injury or those that died of other diseases, pregnant women and women who were nursing were excluded from this study. This study was approved by the Ethics Committee of the hospital, and all enrolled patients signed a written informed consent.

Treatment methods

For regular treatment, all patients underwent the combined treatment of zoledronic acid and radiotherapy. In brief, on the first day, patients received zoledronic acid (4 mg) dissolved in 100 mL normal saline through intravenous injection for 15 min. On the following day, patients underwent radiotherapy using the 6 mV-X ray for local treatment, 2 Gy/time. Each week, patients received radiotherapy five times, with a total dose of 30 to 45 Gy, and the therapy lasted for 3 to 4 weeks.

Nursing intervention

Regular nursing: Attention was paid to the skin of radiotherapy of patients, and the nurses are aware of the changes in physiological indicators, like routine blood tests. In addition, nursing care can be carried out through the diet and medication. The nursing started from the patient's admission in to the hospital until the patient was discharged.

Pain care nursing: Site, profile and degree of pain in patients were evaluated carefully, and nursing procedures were altered specifically by the position transformation and ice compress to reduce the adverse stimuli. In addition, dose was adjusted if necessary. According to the three ladder principle for managing cancer pain of World Health Organization (WHO) and the advice of doctors, analgesics are given appropriately. Meanwhile, psychological nursing and health guidance are adopted to encourage the patients to take sports, so as to distract the attention of patients toward the pain. The nursing started from the patient's admission to the hospital until the patient is discharged.

Measurement outcomes

According to the four degrees categorized by the standards of pain degrees in WHO [14], we evaluated the degrees of ostealgia before and after treatment, and the higher degree repre-

Table 1. General data

	Control group (n=62)	Observation group (n=75)	χ^2	*P*
Sex [(n%)]			0.012	0.912
Man	30 (48.39)	37 (49.33)		
Woman	32 (51.61)	38 (50.67)		
Age [(n%)]			0.160	0.689
≥ 40 years old	41 (66.13)	52 (69.33)		
<40 years old	21 (33.87)	23 (30.67)		
Tumor type [(n%)]			2.167	0.904
Lung cancer	12 (19.35)	14 (21.33)		
Breast cancer	20 (32.26)	23 (30.67)		
Stomach cancer	11 (18.33)	14 (18.67)		
Liver cancer	10 (16.13)	12 (16.00)		
Ovarian cancer	5 (8.06)	7 (9.33)		
Rectal cancer	4 (6.45)	3 (4.00)		
Renal cancer	0 (0.00)	2 (2.67)		
Bone metastasis type [(n%)]			0.068	0.795
Solitary	41 (66.13)	48 (64.00)		
Multiple	21 (33.87)	27 (36.00)		
Education [(n%)]			0.027	0.869
Junior high school, or below	24 (38.71)	28 (37.33)		
Junior high school, or above	38 (61.29)	47 (62.67)		
Residence			1.379	0.240
Village	26 (41.94)	39 (52.00)		
City	36 (58.06)	36 (48.00)		

sented the more severe pain. Anxiety and depression were scored using the self-rating anxiety scale [15] and self-rating depression scale [16] to reflect the changes in the psychological status of patients before and after treatment, and the higher scores represented the severe psychological burden. Also, we evaluated the life quality of patients before and after treatment using the quality of life score (SF-36) [17] with a total score of 100 points, and a higher score suggested a better life quality. Moreover, satisfaction degree toward nursing was measured using the Newcastle Satisfaction with nursing scale (NSNS) [18], and the higher degree showed that patients were more satisfied by the nursing care.

Statistical analysis

SPSS 19.0 (Asia Analytics Formerly SPSS China) was used to process the data. Enumeration data were presented by n (%), and the comparison of rate was performed using the chi-square test. Measurement data, in form of mean ± standard deviation, were compared with the *t* test, while the Pairwise chi-square test was used when intragroup before-after comparison is made. $p<0.05$ suggested that the difference was statistically significant.

Results

General data

In the control group, there were 30 males and 32 females, and 41 patients were aged ≥ 40 years old, while 40 patients were aged <40 years old; in the observation group, there were 37 males and 38 females, and 52 patients were aged ≥ 40 years old, while 23 patients were aged <40 years old. Comparisons of the gender distribution and age between two groups showed no statistical significance ($p>0.05$), and additionally, the comparisons of the tumor types, bone metastasis types, education and residence of patients between two group showed that the differences had no statistical significance ($p>0.05$; **Table 1**).

Analysis of the ostealgia degree of patients in the two groups

Prior to the treatment, comparison of the ratios of patients distributed in four degrees of ostealgia showed that differences had no statistical significance between the two groups ($p>0.05$). Following the treatment, ostealgia of patients in the two groups was ameliorated to varying degrees, and the ratios of patients in 2-degree and 3-degree ostealgia in the two groups were evidently decreased ($p<0.05$), while the ratios in 0-degree and 1-degree were increased ($p<0.05$); whereas the ratio of patients in 0-degree in the observation group remained higher than that in the control group ($p<0.05$), and the ratio of patients in 1-degree in the observation group was lower than that in the control group ($p<0.05$), while the ratios of

Table 2. Analysis of the degree of ostealgia of patients in the two groups

		Control group (n=62)	Observation group (n=75)	χ^2	*P*
0	Prior to treatment	0 (0.00)	0 (0.00)		
	After treatment	25 (40.32)*	54 (72.00)*	13.951	<0.001
1	Prior to treatment	10 (16.13)	14 (18.67)	0.151	0.697
	After treatment	34 (54.84)*	21 (28.00)*	10.175	0.001
2	Prior to treatment	25 (40.32)	29 (38.67)	0.006	0.936
	After treatment	3 (4.84)*	0 (0.00)		
3	Prior to treatment	27 (43.55)	32(42.67)	0.011	0.917
	After treatment	0 (0.00)	0 (0.00)		

Note: *p<0.05 *vs.* the level before treatment.

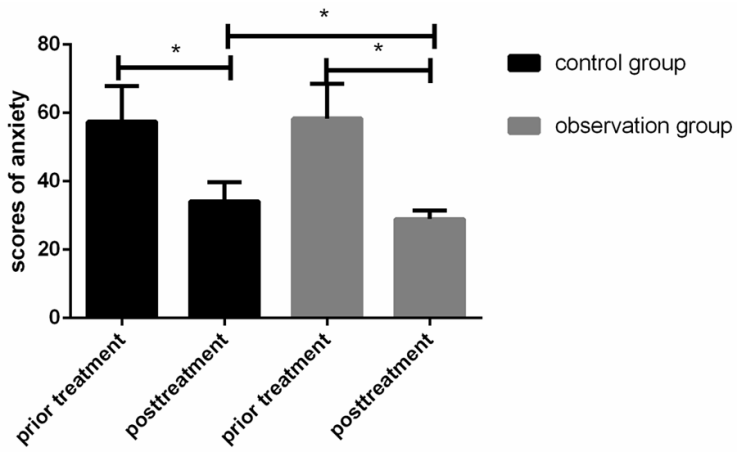

Figure 1. Anxiety score of patients in the two groups. *p<0.05.

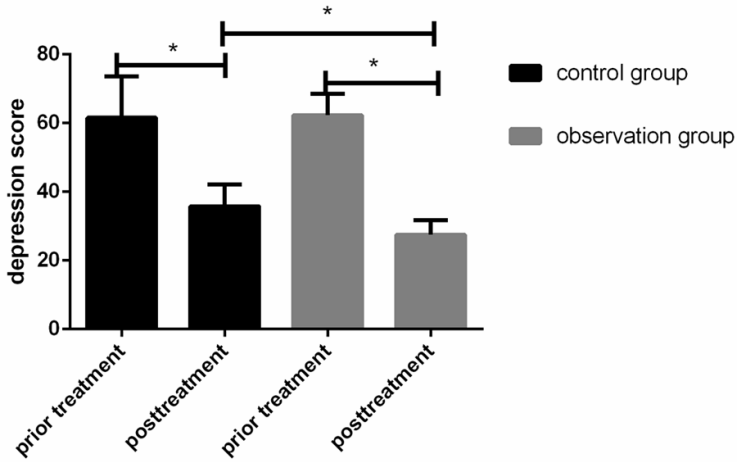

Figure 2. Depression score of patients in the two groups. *p<0.05.

patients in 2- and 3-degree showed that the differences had no statistical significance between the two groups (p>0.05; **Table 2**).

Analysis of the psychological status of patients in the two groups

Before treatment, comparison of the anxiety score and depression score between the two groups showed that the differences had no statistical significance (p>0.05). After treatment, significant decreases were found in the anxiety score and depression score patients in the two groups (p<0.05), but the scores in the observation group were much lower than those in the control group (p< 0.05; **Figures 1** and **2**).

Life quality of patients

Before treatment, comparison of the life quality score between the two groups showed that the difference had no statistical significance (p>0.05). After treatment, the life quality scores in these two groups were also clearly ameliorated (p<0.05), but the life quality score in the observation group was much higher than that in the control group (p<0.05; **Table 3**).

Analysis of the satisfaction degree toward nursing of patients in the two groups

In the control group, the satisfaction degree toward nursing was (82.36±9.47) points, this was considerably lower than (95.26±7.12) points in the observation group, and the difference had statistical significance (p<0.05; **Figure 3**).

Discussion

Paincomplicates psychological status, and is the most frequent form of complication in patients with bone metastasis in malignant tumors, severely affecting the life quality and mental status of patients, or even the efficacy of treat-

Table 3. Quality of life scores

		Control group (n=62)	Observation group (n=75)	t	*P*
Emotional function	Prior to treatment	53.47±9.48	52.79±9.36	0.421	0.675
	After treatment	68.45±7.26	82.17±6.88	11.331	<0.001
Role function	Prior to treatment	49.34±8.57	51.26±8.69	1.295	0.197
	After treatment	60.49±10.18	80.19±8.34	12.452	<0.001
Cognitive function	Prior to treatment	50.33±8.97	51.16±8.42	0.558	0.578
	After treatment	64.78±11.21	80.17±10.45	8.302	<0.001
Physical function	Prior to treatment	48.26±7.17	50.08±7.64	1.403	0.163
	After treatment	67.14±10.03	76.47±12.14	4.843	<0.001
Social function	Prior to treatment	48.89±7.43	49.25±7.36	0.284	0.777
	After treatment	66.45±8.47	78.29±11.26	6.833	<0.001

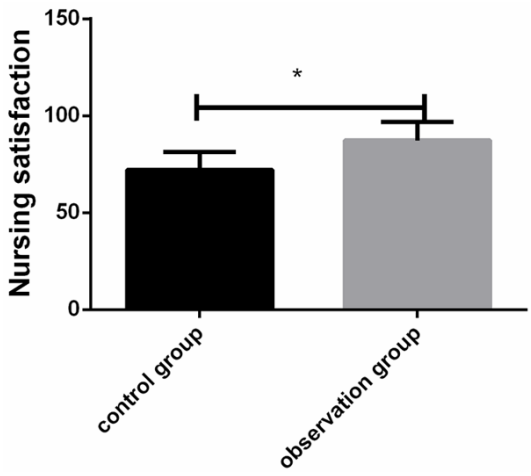

Figure 3. Analysis of the satisfaction degree toward nursing of patients in the two groups. *p<0.05.

ment [19, 20]. Thus, it is necessary to control the pain for patients. In spite of the positive effect of zoledronic acid in ameliorating the pain of patients [21], more and more stringent requirements on the treatment needs more methods to mitigate the pain caused by the diseases to improve the efficacy of treatment, as well as the life quality and psychological status. Accumulating evidence has shown that pain care nursing can mitigate the cancer pain and ameliorate the life quality [10-12]. Thus, through this study, we performed pain care nursing on the basis of the combined treatment of zoledronic acid and chemotherapy for malignant tumor patients with bone metastasis to analyze the clinical value, so as to provide guidance for the clinical treatment.

In this study, we retrospectively analyzed the clinical data of 137 malignant tumor patients with bone metastasis who underwent nursing care, and found that the baseline data of patients in the two treatment groups showed no statistically significant difference, suggesting that the data were comparable. Ostealgia, as one of the major complications in patients with bone metastasis of malignant tumors, and is always concomitant with other complications. Thus, ameliorating, or curing the ostealgia has been one of the major targets of treatment in patients with bone metastasis in malignant tumors [22]. Zoledronic acid is not only an efficient drug for ostealgia, but also the auxiliary reagent in standard anti-tumor therapy [23]. We used the categorization of ostealgia degree of WHO as the criteria for evaluating the efficacy of nursing procedures in the combined treatment of zoledronic acid and radiotherapy for patients with bone metastasis in malignant tumors. Prior to the treatment, the proportions of patients distributed in four degrees of ostealgia showed that differences had no statistical significance between the two groups (p>0.05). Following the treatment, degrees of ostealgia were decreased in patients of the two groups, mainly in 0-degree and 1-degree. However, the ratio of patients in 0-degree in the observation group was higher than that in the control group, suggesting that pain care nursing can improve the efficacy of zoledronic acid on the ostealgia in a more efficient way than the regular nursing. There remains little information regarding the role of nursing care in the medication of zoledronic acid, and only one literature reported that nursing care is advantageous for enhancing the efficacy of zoledronic acid on the ostealgia in patients with bone metastasis in malignant tumors [24], which is consistent with the results of our study. We hope that researchers will pay more attention to the applications of pain care nursing. Pains usually alter the psy-

chological status of patients, e.g. the anxiety and depression, and severe psychological status can reduce the compliance of patients to the treatment, and affect the efficacy, furthermore exacerbating the disease. Thus, the second objective should be ameliorating the psychological status of patients to keep them happy [25, 26].

Analysis of our results suggested that these two nursing methods can improve the scores of anxiety and depression of patients, but patients receiving the pain care nursing gained more improvement than those receiving the regular nursing care. Sequentially, we also analyzed the life quality and satisfaction degree toward nursing, and found the changes in these indexes in the observation group were superior to those in the control group, which are the result of pain care nursing improving the efficacy and the psychological status. The deficiency of relevant literatures leads to the failure of verification on such an effect in pain care nursing. In the meantime, different age groups have different tolerances to pain, and they respond differently to medications and nursing, which may cause bias in our results. Additionally, the second objective of nursing care should be reducing disease-caused complications of treatment-associated adverse reactions, which, however, were not analyzed in this study. We will perform more focused studies regarding these limitations in the future.

In conclusion, for patients with bone metastasis of malignant tumors, pain care nursing can improve the efficacy of combined treatment of radiotherapy and zoledronic acid, ameliorate anxiety and depression, improve life quality and the satisfaction degree toward nursing.

Disclosure of conflict of interest

None.

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