

Original Article

Effect of multi-platform extended care on postoperative self-efficacy and quality of life in patients with osteoporotic vertebral compressive fracture

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Abstract: Objectives: This study analyzed the effect of multi-platform extended care on postoperative self-efficacy and quality of life in patients with osteoporotic vertebral compressive fracture (OVCF). Methods: 162 OVCF patients who underwent percutaneous vertebroplasty (PVP) or percutaneous kyphoplasty (PKP) surgery in our hospital from January 2018 to June 2019 were classified into a control group (n=78) and an observation group (n=84) based on the admission time. The control group was given conventional health guidance and follow-up by telephone, and the observation group got multi-platform extended care. The postoperative incidence of re-fracture, Oswestry dysfunction index (ODI) before and after intervention, self-efficacy and quality of life were compared between the two groups. Results: Incidence of re-fracture in the observation group was higher than that of the control group ($P<0.05$). The ODI scores of the two groups 3, 6, and 12 months after operation were lower than those on discharge ($P<0.05$), and the observation group had lower OD scores than the control group 6 and 12 months after operation ($P<0.05$). The self-efficacy scores of the two groups 6 months after discharge were higher than that on discharge ($P<0.05$), and the index in the observation group was higher than that of the control group ($P<0.05$). In addition, the scores of all dimensions of quality of life in two groups 6 months of discharge were higher than those on discharge ($P<0.05$), and the scores in the observation group were higher than those of the control group ($P<0.05$). Conclusion: Multi-platform extended care can effectively reduce the risk of postoperative re-fracture in OVCF patients, facilitate the improvement of patients' lumbar function, self-efficacy, and quality of life, and improve the prognosis of patients, which is worthy of clinical promotion.

Keywords: Multi-platform extended care, osteoporosis, vertebral compression fracture, self-efficacy, living quality

Introduction

Osteoporotic vertebral compression fracture (OVCF) is a common disease among the elderly. Percutaneous vertebroplasty (PVP) and percutaneous kyphoplasty (PKP) are commonly used treatments, and can quickly relieve pain and assist patients to recover normal life with short hospital stays [1]. Although PKP and PVP surgeries are widely used in clinical practice, the incidence of postoperative refracture in patients is high, which not only brings serious psy-

chological pressure to patients, but also affects the quality of life [2]. In addition, most patients engage in manual labor prematurely after discharge, and fail to take medicine in accordance with the doctor's advice or suspend medicine without authorization, imposing a substandard anti-osteoporosis treatment. Compliance directly affects the therapeutic effect of osteoporosis [3, 4]. Traditional nursing methods are limited to the guidance of patients during hospitalization, while most of the post-discharge care is carried out by telephone follow-up. Extended

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care, unlike conventional treatment, is designed through a series of actions to ensure that patients can receive professional extended care outside the hospital, thereby guiding a change in patients' behavior [5, 6]. In order to further improve the compliance of OVCF patients with postoperative treatment, this study explored and analyzed the effect of multi-platform extended care on postoperative self-efficacy and quality of life in OVCF patients.

Materials and methods

Clinical data

162 OVCF patients who underwent PVP or PKP surgery in our hospital from January 2018 to June 2019 were chosen and classified into a control group (n=78) and an observation group (n=84) based on the admission time. The study was conducted under approval of the ethics committee of our hospital.

Inclusion and exclusion criteria

Inclusion: (1) Patients diagnosed with OVCF by MRI; (2) Patients underwent PVP or PKP surgery; (3) Age ≥ 60 years old; (4) The time from fracture to operation ≤ 14 days; (5) Patients and their families voluntarily signed informed consent.

Exclusion criteria: (1) Patients underwent open surgery; (2) Patients with spinal cord compression; (3) Patients with vertebral tumor or tuberculosis; (4) Patients with neurological deficits; (5) Patients with psychiatric diseases; (6) Patients with primary diseases of digestive system, urinary system, and cardiovascular system.

Methods

The control-group patients received routine nursing intervention, including propaganda and education on admission and discharge guidance. The responsible nurse conducted telephone follow-up to the patients 1 month, 3 months, 6 months and 12 months after discharge respectively, and understood the medication compliance and the occurrence of refracture of patients. The observation-group patients were treated with multi-platform extended care with specific procedures as follows: (1) Established a continuing care service team, formulated detailed procedures and

assignment of responsibilities and conducted training for the team members on telephone calls, family follow-up etiquette and communication. (2) Established the follow-up information files on patients after discharge, which covered the patient's name, gender, age, admission number, diagnosis, operation condition, discharge date, discharge medications, bone density, educational degree, home address, telephone number, etc. (3) Clarified the follow-up method: the "OVCF home" section was set up on hospital website, and a responsible nurse was assigned for updating and maintaining the treatment and nursing knowledge of OVCF, and regularly answering the consultation questions of patients. A WeChat group of "OVCF Therapeutics" was established, where three responsible nurses released treatment and nursing knowledge every day. At the same time, a fixed time was settled to answer the questions during treatment and nursing process of patients and their families; the nursing staff reminded patients to take the medicine daily in the WeChat group, and informed the time for patients to return for review. The team members strengthen the telephone follow-up and family follow-up of patients. The telephone follow-up was conducted once a week for 10-20 min in the first month after discharge, and once every two weeks for 10-20 min in the second month. Family follow-up: once every 2 weeks for 20-30 minutes in the first month, and once a month from the second month for 20-30 minutes each time. (4) Content of extended care: general knowledge of OVCF (including the concept of OVCF, osteoporosis health care knowledge, etc.), medication knowledge (such as drug management, common adverse reactions), daily life precautions (such as proper diet, correct exercise, safe environment), pain monitoring, medication compliance and psychological support. The working group adopted the individualized guidance and adjusted the content of propaganda and education according to the situation of patients.

Observation of indexes

(1) The incidences of re-fracture 3 months, 6 months, and 12 months after surgery were compared between the two groups.

(2) Lumbar Oswestry Dysfunction Index (ODI score) was adopted to score patients' lumbar spine function at discharge, and 3 months, 6

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Table 1. Comparison of clinical data between the two groups of patients

| Clinical data | Observation group (n=84) | Control group (n=78) | t/x ² | P |
|--|--------------------------|----------------------|------------------|-------|
| Gender | | | | |
| Male | 51 | 47 | 0.004 | 0.953 |
| Female | 33 | 31 | | |
| Age (years, $\bar{x} \pm sd$) | 68.95±7.32 | 69.27±8.20 | 0.262 | 0.793 |
| Bone density (SD, $\bar{x} \pm sd$) | -4.21±0.65 | -4.19±0.59 | 0.205 | 0.838 |
| Diabetes mellitus (n, %) | 31 (36.90) | 32 (41.03) | 0.289 | 0.591 |
| Time from injury to operation (d, $\bar{x} \pm sd$) | 10.82±3.36 | 10.64±3.17 | 0.350 | 0.727 |
| Operation method | | | | |
| PVP | 39 | 34 | 0.132 | 0.717 |
| PKP | 45 | 44 | | |
| Length of operation (min, $\bar{x} \pm sd$) | 34.07±11.26 | 34.33±12.03 | 0.142 | 0.887 |

Table 2. Comparison of re-fracture rate in two groups after operation

| Group | Number of cases | 3 months postoperatively | 6 months postoperatively | 12 months postoperatively | Total |
|-------------------|-----------------|--------------------------|--------------------------|---------------------------|------------|
| Observation group | 84 | 2 (2.38) | 3 (3.57) | 5 (5.95) | 10 (11.90) |
| Control group | 78 | 5 (6.41) | 8 (10.26) | 9 (11.54) | 22 (28.21) |
| x ² | - | - | - | - | 6.779 |
| P | - | - | - | - | 0.009 |

months, and 12 months postoperatively [7]. The index included 10 items of the degree of back pain or leg pain, self-care, lifting weights, walking status, sitting position, standing, sleeping, etc. Each item has 6 alternative answers, scoring from 0 to 5 points. A score of 0 indicated no dysfunction occurred and 5 referred to a dysfunction as obvious. The total score of the scale was calculated, and a higher score represented the more obvious dysfunction.

(3) General Self-efficacy Scale (GSES) was employed to evaluate the self-efficacy of patients in two groups at discharge and 6 months after discharge [8]. The scale contained 10 items, with each item marked a score of 1 to 4 points. A higher score referred to better patient's sense of self-efficacy.

(4) SF-36 scale was used to score patients' quality of life at discharge and 6 months after discharge [9]. The scale included eight dimensions of physiological function (PF), role functioning (RF), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE) and mental health (MH), each with a total score of 100 points. A higher patient's score indicated better living quality.

Statistical analysis

Data arrangement and analysis were conducted by statistical tool SPSS 25.0. The *t* test and x² test were used for comparison of measured data and enumerated data respectively. A difference was accepted as significant if *P*<0.05.

Results

Clinical data

The differences in clinical data between the two groups of patients were not significant (*P*>0.05), as shown in **Table 1**.

Re-fracture rate

The incidence of re-fracture in the observation group was 11.90%, and that in the control group was 28.21%. The incidence of re-fracture in the observation group was critically higher than that of the control group (*P*<0.05), as shown in **Table 2**.

Comparison of ODI scores

There was no significant difference in the ODI scores of the two groups of patients on dis-

Table 3. Comparison of ODI scores between the two groups after operation (points, $\bar{x} \pm sd$)

| Group | Number of cases | On discharge | 3 months postoperatively | 6 months postoperatively | 12 months postoperatively |
|-------------------|-----------------|--------------|--------------------------|--------------------------|---------------------------|
| Observation group | 84 | 16.08±3.83 | 10.98±2.10* | 6.04±1.52* | 5.74±1.07* |
| Control group | 78 | 16.67±2.93 | 12.78±2.36* | 8.33±1.64* | 7.95±1.14* |
| t | - | 1.095 | 5.136 | 9.224 | 12.728 |
| P | - | 0.275 | 0.000 | 0.000 | 0.000 |

Note: Compared with on discharge, *P<0.05.

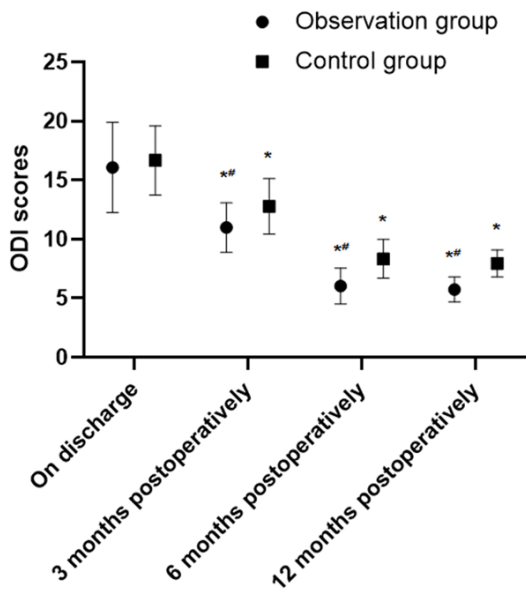


Figure 1. Comparison of ODI scores between the two groups after operation. Note: compared with the same group on discharge, *P<0.05; compared with the control group, #P<0.05.

charge ($P>0.05$). The scores of the two groups 3, 6, and 12 months after operation were lower than those on discharge ($P<0.05$), and the observation group had lower ODI scores 6 and 12 months after operation than the control group ($P<0.05$), as shown in **Table 3** and **Figure 1**.

Comparison of self-efficacy between the two groups

There was no significant difference in self-efficacy score between the two groups on discharge ($P>0.05$). The self-efficacy scores of the two groups 6 months after discharge were higher than that on discharge ($P<0.05$), and the index in the observation group was higher than that in the control group ($P<0.05$), as shown in **Table 4** and **Figure 2**.

Comparison of quality of life

There was no significant difference in dimensions of the quality of life between the two groups (including physiological functioning, physiological functioning, physical pain, general health status, vitality, social functioning, emotional functioning, and mental health) at discharge ($P>0.05$). The scores of the two groups of patients 6 months after discharge were higher than those at discharge ($P<0.05$), and the scores of the observation group were higher than those of the control group, ($P<0.05$), see **Table 5**.

Discussion

OVCF is related to a large amount of calcium loss in vertebral tissue caused by osteoporosis. It can reduce the density and strength of bones and result in single or multiple vertebral fractures [10]. The disease is one of the common complications in patients with osteoporosis, and can impose serious impact on living quality if effective measures are not taken [11]. According to relevant statistics, OVCF has a high disability and fatality rate. Clinically, OVCF is generally treated with minimally invasive surgery, but long-term efficacy of surgery is critically correlated with long-term anti-osteoporosis treatment. Although the surgery can effectively shorten the length of hospital stay, there are still high health risks after discharge that need to be guided by professional nursing care [12-14].

At present, there is still a lack of extended nursing care for OVCF in China, and patients have poor postoperative self-management ability. Due to a lack of correct understanding of the disease, patients are unable to conduct effective self-monitoring and management, which can cause serious complications and increased risk of re-fracture, and lead to the reduction

Table 4. Comparison of self-efficacy scores between the two groups (points, $\bar{x} \pm sd$)

| Group | Number of cases | On discharge | 6 months after discharge | t | P |
|-------------------|-----------------|--------------|--------------------------|--------|-------|
| Observation group | 84 | 21.85±4.83 | 35.86±5.39 | 17.742 | 0.000 |
| Control group | 78 | 22.07±5.22 | 30.21±4.75 | 10.186 | 0.000 |
| t | - | 0.279 | 7.056 | - | - |
| P | - | 0.781 | 0.000 | - | - |

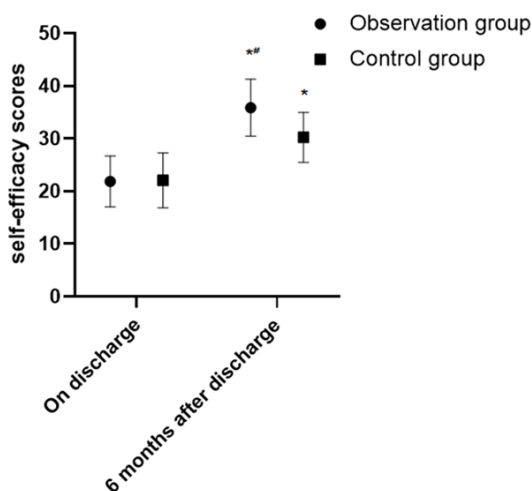


Figure 2. Comparison of self-efficacy scores between the two groups. Note: Compared with the same group on discharge, *P<0.05; compared with the control group, #P<0.05.

of quality of life [15, 16]. This study analyzed the effect of multi-platform extended care on postoperative self-efficacy and quality of life in patients with OVCF.

The results of the study indicated that the incidence of postoperative re-fracture in observation group was higher than that in control group. The postoperative ODI score, improvement in self-efficacy, and quality of life in observation group were higher than those of the control group. This suggested that the multi-platform extended care can effectively reduce the risk of patient’s re-fracture after discharge, and is conducive to improving their lumbar function, self-efficacy and quality of life, which finding is similar to the results reported by other scholars [17-19]. As a new nursing mode, extended nursing care stretches the traditional routine nursing into daily life, and it solves the post-discharge nursing problem for some patients. However, the traditional continuing nursing model is relatively simple, mostly based on manual visits and telephone follow-ups that cannot achieve ideal nursing results. At the same time,

the quality of nursing care is not guaranteed because of uneven skill of the nursing staff [20-22]. Therefore, this study adopted the combination of a network platform, Wechat platform and traditional telephone follow-up and door-to-door follow-up to strengthen the contact with patients, improve the activity of patients for treatment and medication compliance, and at the same time, provide professional training for members of the extended nursing group to improve the nursing quality and effectiveness.

This study results, similar to those of other scholars [23, 24], indicate that the multi-platform extended care can increase contact between patients and their families, as well as the patients and nursing staff. It plays a certain role in the supervision and management of patients, and improves the initiative of patients in treatment, which is of great value for improving quality of extended care.

However, due to the relatively small sample size included in this study, and considering that there may be a large difference between nursing services after randomization, measurement bias may exist for time grouping. Therefore, it is necessary to further improve the research method in the follow-up experiments to obtain more reliable research results.

In summary, multi-platform extended care can effectively reduce the risk of re-fracture in OVCF patients after surgery, facilitate improvement of their lumbar function, self-efficacy, and quality of life, and improve their prognosis.

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Disclosure of conflict of interest

None.

Table 5. Comparison of living quality between the two groups (points, $\bar{x} \pm sd$)

| Dimension | Observation group (n=84) | | t | P | Control group (n=78) | | t | P |
|-----------|--------------------------|--------------------------|--------|-------|----------------------|--------------------------|-------|-------|
| | On discharge | 6 months after discharge | | | On discharge | 6 months after discharge | | |
| PF | 64.92±8.39 | 78.64±9.04* | 10.196 | 0.000 | 64.27±7.47 | 71.28±6.58 | 6.219 | 0.000 |
| RF | 66.84±9.10 | 81.26±7.95* | 10.937 | 0.000 | 67.42±8.94 | 75.29±7.40 | 5.989 | 0.000 |
| BP | 63.97±5.84 | 76.33±6.92* | 12.510 | 0.000 | 64.75±6.12 | 70.21±8.06 | 4.765 | 0.000 |
| GH | 67.85±7.92 | 79.22±4.37* | 11.520 | 0.000 | 68.46±8.09 | 74.26±6.85 | 4.832 | 0.000 |
| VT | 70.02±7.53 | 83.46±8.38* | 10.934 | 0.000 | 69.89±8.21 | 76.58±7.32 | 5.372 | 0.000 |
| SF | 65.49±6.48 | 78.96±8.04* | 11.955 | 0.000 | 66.01±8.36 | 72.41±7.08 | 5.160 | 0.000 |
| RE | 62.47±7.93 | 77.33±9.27* | 11.164 | 0.000 | 63.48±9.20 | 69.38±6.95 | 4.519 | 0.000 |
| MH | 67.39±5.38 | 83.42±10.28* | 12.662 | 0.000 | 68.95±7.04 | 76.95±9.12 | 6.133 | 0.000 |

Note: Compared with the control group, *P<0.05.

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