

## *Effect of Teriparatide and Bisphosphonates in Advanced Patients with Osteoporosis*

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**Abstract:** This paper mainly analyzes and studies the clinical treatment effect of teriparatide and bisphosphonates in elderly patients with osteoporosis. 60 elderly osteoporosis patients admitted to our hospital from October 2021 to October 2022 were randomly selected and divided into two groups: observation group and control group by single and single coin method, and the number of patients in each group was 30. 30 patients in the control group were treated with zoledronic acid for advanced osteoporosis, and 30 patients in the observation group were treated with teriparatide and bisphosphonate. Comparing the pain scores, bone density values, bone metabolism indicators and the incidence of adverse reactions between the two groups. Among them, the VAS score ( $1.22 \pm 0.17$ ) was lower than that of the control group ( $3.69 \pm 1.30$ ), ( $p < 0.05$ ); the observation group and the control group ( $p < 0.05$ ); the levels of calcium, blood phosphorus, osteocalcin and alkaline phosphatase increased after treatment, and the observation group, ( $p < 0.05$ ); there was no difference in adverse reactions between the observation group and the control group, ( $p > 0.05$ ). The results show that for patients with osteoporosis, using teriparatide and bisphosphate sequential treatment, can effectively relieve the pain symptoms, and improve the bone mineral density, improve the bone metabolism index of patients, reduce the incidence of adverse reactions, ensure the safety and effectiveness of medication, can promote the application value in clinical high of a treatment.

Osteoporosis is a systemic disease. Most people believe that osteoporosis is a phenomenon of normal aging, but in fact the mechanism of osteoporosis is a disease characterized by reduced bone density, destruction of bone tissue microstructure, characterized by increased bone fragility and susceptibility to fracture[1]. According to the epidemiology, the occurrence of osteoporosis is positively related with age. The incidence of osteoporosis in the elderly population in China is about 40%, and the patients are mostly seen in women[2]. Geriatric osteoporosis generally refers to the osteoporosis in the elderly over 70 years old. A degenerative lesion that occurs according to the increase of age. For each increase of 10 years, the bone mass decreases by 5% in men and 7% in women[3]. Because the patient has no conscious symptoms in the early stage of osteoporosis, or the symptoms are not obvious, there is no timely therapeutic intervention. Due to the progress of the disease, patients often feel fatigue, back pain, and even systemic bone pain, serious patients have

hunchback, length shortening symptoms[4]. Fractures are a symptom of osteoporosis, and patients often seek severe pain or fractures, but have missed the best time for treatment. Therefore, clinically, osteoporosis is also called a recessive killer[5]. For hip fractures due to osteoporosis, about a quarter of patients die in the first year after the occurrence of various complications, and the surviving patients have various degrees of disability. It can be seen that the consequences of osteoporosis are very serious, and we need to pay attention to the treatment of osteoporosis, which can effectively reduce the chance of fracture in patients[6]. At the current stage, the treatment of osteoporosis is usually to adjust the patient's lifestyle, drug intervention and other ways, while the drug treatment takes bone resorption inhibitors, bone formation promoters and other treatment of osteoporosis.

Diphosphonates, calcitonin drugs can reduce osteoclasts and function. Slow down the rate of bone dissolution. And the parathyroid hormone analog, which can improve the osteogenic function of osteoblasts, can fill the actual bone mass, increase the bone mass, and repair the bone microstructure[7]. According to the study, PTH analogues and bisphosphate sequential treatment can effectively improve the treatment effect of osteoporosis patients, teriparatide can stimulate bone resorption and bone formation, bisphosphonate can inhibit the transfer of bone cells, play the role of inhibiting osteoblast specificity, thus inhibiting the digestion and absorption of bone hyperplasia[8]. Bisphosphonates classify many drugs, and the current better drugs are zoledronic acid, pamidronate acid, alendronic acid, etc[9]. Based on this, this study will analyze the clinical treatment efficacy of sequential treatment with teriparatide and bisphosphonates in elderly osteoporosis patients, as follows.

## 1. Data and Methods

### 1.1 General Information

With the approval of our hospital, 60 elderly osteoporosis patients admitted to our hospital from October 2021 to October 2022 were selected. The 60 patients were divided into observation and control groups, with a number of 30 patients in each group. The control group was male (n=12), female (n=18), age 75-96 years, mean (85.53 ± 5.69); disease duration 3-9 years, mean (6.24 ± 1.06) years. Male (n=11), female (n=19), age 74-95 years, mean (84.95 ± 5.33); duration 2-8 years, mean (5.97 ± 1.02) years. The two sets of general data were compared (P> 0.05) and were comparable.

Inclusion criteria: (1) all patients were > 70 years old; (2) all patients were eligible for advanced age osteoporosis after examination; (3) complete data and signed informed documents.

Exclusion criteria: (1) psychiatric history; (2) language disorders and consciousness disorders; (3) allergy to teriparatide and bisphosphonates; (4) malignant tumors; (5) abnormal liver and kidney function; (6) other orthopedic diseases; and (7) other medication before the study.

### 1.2 Methods

Patients in the observation and control groups received bone health supplement addition, namely calcium intake, and took calcium carbonate D3 tablets (manufacturer: Beijing Zhendong Kangyuan Pharmaceutical Co., LTD. Approval number: National drug approval H20093675 Specification: 0.5g 36 tablets dosage form: tablets), which could slow down bone loss and improve bone mineralization. At the same time, guide patients to adjust their lifestyle, strengthen a balanced diet, and suggest that patients eat low salt, rich in calcium and moderate protein. Guide patients to get more sun to promote the synthesis of vitamin D in the body, and guide patients to do physical exercise or rehabilitation exercise conducive to bone health, including weight-bearing exercise and resistance exercise, such as walking, Taiji, etc. Guide patients to stop smoking and ban alcohol,

avoid excessive intake of coffee and carbonated drinks, and try to avoid and use less drugs that affect bone metabolism.

### 1.2.1 Control Group

The control group used zoledronic acid for osteoporosis in old age. Patients received intravenous infusion of zoledronic acid (manufacturer: Yangzijiang Pharmaceutical Group Sichuan Hairong Pharmaceutical Co., LTD. Approval number: National drug approval H20183098 Specification: 100ml: 5mg dosage form: injection). The drug dose and administration method are as follows: 5mg, intravenous infusion, 1 dose per year.

### 1.2.2 Observation Group

The observation group used teriparatide and bisphosphonates for advanced age osteoporosis. Zoledronic acid, as used in the control group, was given teriparatide 6 months after treatment (manufacturer: Shanghai United Zel Biological Engineering Co., LTD. Approval No.: National drug approval S20170004 Specification: 200U (20 ug) dosage form: injection). The dose and mode of administration are as follows: 20 u g/d for 6 months.

### 1.3 Observed Indicators

- (1) Compared with the pain scores of the two groups. VAS pain score scale with a full score of 10 and those with lower score indicate less severe pain.
- (2) The bone mineral density values of the two groups were compared.
- (3) Comparing the level of bone metabolism indicators between the two groups.
- (4) Compare the incidence of adverse reactions in the two groups.

### 1.4 Statistical Analysis

$\bar{x} \pm s$  The data were analyzed and processed by statistical software spss24.0. Measurement data were expressed by mean  $\pm$  standard deviation ( $\bar{x} \pm s$ ), t test, count data by (%), and chi-square test.  $P < 0.05$  indicates statistical significant difference.

## 2. Results

### 2.1 Comparison of Patient Pain Scores between the Two Groups

Pain in the two groups, ( $p > 0.05$ ) and lower after treatment than the control group, ( $p < 0.05$ ), is shown in Table 1.

Table 1: Analysis of Pain Level of patients ( $\pm s$ )

group	Example number	VAS grade	
		pretherapy	post-treatment
observation group	30	5.56 $\pm$ 1.23	1.22 $\pm$ 0.17
control group	30	5.61 $\pm$ 1.31	3.69 $\pm$ 1.30
t		0.152	10.319
P		0.879	0.000

### 2.2 Comparison of Bone Mineral Density Values between the Two Patient Groups

There was no difference in the BMD values before the treatment, ( $p > 0.05$ ), after the treatment,

and the hip, femoral neck, lumbar spine were higher than the control group, ( $p < 0.05$ ), as shown in Table 2.

Table 2: Comparison of bone mineral density values ( $\pm s$ )  $\bar{x}$

group	hip		collum femoris		lumbar vertebra	
	pretherapy	post-treatment	pretherapy	post-treatment	pretherapy	post-treatment
Observation group (n=30)	0.65 $\pm$ 0.13	0.87 $\pm$ 0.19	0.63 $\pm$ 0.10	0.78 $\pm$ 0.19	0.71 $\pm$ 0.14	0.89 $\pm$ 0.20
Control group (n=30)	0.64 $\pm$ 0.15	0.71 $\pm$ 0.13	0.61 $\pm$ 0.12	0.62 $\pm$ 0.11	0.68 $\pm$ 0.13	0.75 $\pm$ 0.15
<i>t</i>	0.276	3.807	0.701	3.992	0.860	3.067
<i>p</i>	0.784	0.000	0.486	0.000	0.393	0.003

### 2.3 Comparison of Bone Metabolic Index Levels between the Two Groups

The levels of bone blood calcium, blood phosphorus, osteocalcin and alkaline phosphatase in both groups increased after treatment, and the level of bone metabolism in the observation group was higher than that in the control group. ( $p < 0.05$ ), as shown in Table 3.

Table 3: Comparison of bone metabolic indicators ( $\pm s$ )  $\bar{x}$

group	Blood calcium (mmol/L)		Blood phosphorus (mmol/L)		Osteocalcin (U / L)		Alkaline phosphatase (ug / L)	
	pretherapy	post-treatment	pretherapy	post-treatment	pretherapy	post-treatment	pretherapy	post-treatment
observation group	2.12 $\pm$ 0.25	2.56 $\pm$ 0.38	1.41 $\pm$ 0.18	1.79 $\pm$ 0.32	6.21 $\pm$ 2.17	7.87 $\pm$ 3.61	7.41 $\pm$ 3.10	9.58 $\pm$ 3.71
control group	2.05 $\pm$ 0.21	2.36 $\pm$ 0.35	1.37 $\pm$ 0.19	1.61 $\pm$ 0.28	6.15 $\pm$ 2.13	6.04 $\pm$ 3.12	7.53 $\pm$ 3.11	7.76 $\pm$ 3.26
<i>t</i>	1.174	2.120	0.837	2.319	0.108	2.101	0.150	2.018
<i>p</i>	0.245	0.038	0.406	0.024	0.914	0.040	0.882	0.048

### 2.4 Comparison of the Incidence of Adverse Reactions in the Two Groups

In the observation group, 1 had fever and 1 had arthralgia, the incidence of adverse reactions was (6.67%); in the control group, 1 had fever and 2 had diarrhea, the incidence of adverse reactions was (10%). There was no difference in the incidence of adverse reactions between the observed and control group ( $p=0.640$ ).

## 3. Discuss

Osteoporosis is a group of bone diseases caused by a variety of reasons, mainly characterized by the decrease of bone tissue in the human body, the decrease of bone density, the increase of bone fragility, and the destruction of the microstructure of bone tissue, which in patients prone to fracture[10]. Osteoporosis is a prone disease in the elderly, and with the increase of age, bone mass will decrease, leading to the pain of the elderly, and prone to fracture, which is slow healing. Non-healing occurs in Shenzhen, and the operation is difficult[11]. Osteoporosis can also lead to shorter height and smaller stature, which will affect the normal life of patients. Clinically, the treatment is usually drug intervention and lifestyle adjustment, which can increase bone mineral density and reduce the destruction of bone microstructure, but the treatment cycle is longer[12].

The results of this study indicate that the. The sequential treatment with teriparatide and bisphosphonates in the observation group could relieve the pain, and the bone mineral density value in the observation group was higher and the bone metabolism level was improved than the control

group. This indicates that the combination of the two is effective and can effectively relieve pain. Zoledronic acid and teriparatide conversion therapy can increase the activity of osteoblasts, prevent bone loss and increase bone density in patients. Bone metabolism level plays an important role in the body bone turnover. The application of the two can improve the bone metabolism level of elderly osteoporosis patients, promote the formation of bone, and reduce the chance of fracture in patients[13].

In conclusion, the application of teriparatide and bisphosphonate treatment in elderly osteoporosis patients can reduce the pain, improve the bone density value, improve the bone metabolism level, and reduce the occurrence of adverse reactions, which is worthy of clinical promotion.

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