

Comparative Analysis and Exploration of Clinical Value of Kyphoplasty and Conservative Treatment for Osteoporotic Vertebral Compression Fractures

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Abstract: *Objective:* To explore the clinical value of kyphoplasty and conservative treatment for osteoporotic vertebral compression fractures. *Methods:* 40 patients with Osteoporotic vertebral compression fracture from May 2019 to November 2021 were selected. The control group was treated with conservative treatment and the experimental group was treated with kyphoplasty. *Results:* Compared with the control group, the experimental group had higher total effective rate (95.00%), better recovery of Cobb Angle and vertebral height, and higher quality of life score. The data was more meaningful ($P < 0.05$). *Conclusion:* For patients with osteoporotic vertebral compression fractures, the application of kyphoplasty can improve the treatment effect, accelerate the recovery of vertebral body function and enhance the quality of life, which is worthy of popularization.

Keywords: Osteoporotic vertebral compression fracture; Kyphoplasty; Conservative treatment; Value

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1. Introduction

Osteoporotic vertebral compression fracture is a common disease in modern orthopedics. It occurs frequently in postmenopausal women. It is related to bone fragility, low bone mass and low bone strength, which greatly affects their quality of life^[1]. Conservative treatment is the previous treatment of the disease, but there are some defects, such as poor effect and unsatisfactory expected effect. With the progress of medical technology, kyphoplasty has gradually become the first choice for the treatment of this disease, and the effect is better, but the curative effects of the two have not been compared and analyzed. Forty patients with osteoporotic vertebral compression fracture were reported as follows:

2. Materials and methods

2.1. Basic information

Forty patients with osteoporotic vertebral compression fractures from May 2019 to November 2021 were divided into control group and experimental group by lot, with 20 cases in each group. There were 12 male patients and 28 female patients; The mean age was (69.36 ± 2.09) years old and the mean course of disease was (13.13 ± 1.86) months. There was no difference between data ($P > 0.05$).

(1) Selection principles are: MRI and X-ray examination met the criteria of osteoporotic vertebral compression fracture and met the surgical indications. It was approved by the Ethics Committee and patients signed informed consent.

(2) Elimination principles are: Patients with nerve injury, mental disorder, organic disease and fracture due to other causes.

2.2. Method

The control group received conservative treatment, and the operation was as follows: The patient was adjusted to a supine position, and the fracture site was padded up by 10-15cm with the help of a soft pillow, showing the state of posterior extension of spine; The patient stayed in bed for 1 week. If the pain was reduced, it could cooperate with the exercise of lumbar and back muscles, such as lying flat with 3-5 points of support. But it should be carried on step by step and not be impatient. Waist circumference protection could be performed at 3 months to guide patients to get out of bed for exercise, 20min / time, twice a day [2].

The experimental group underwent kyphoplasty. The operation was as follows: After general anesthesia, the patients were placed in prone position, combined with the use of C-arm X-ray machine to explore the needle insertion and bone cement injection, and adjust the best approach, such as transpedicular approach and lateral lumbar approach. Then the puncture needle was inserted into the vertebral body, the needle core was pulled out, the guide needle was inserted into the anterior and inferior edge of the vertebral body, and the sleeve was pulled out. The working and expanding sleeves were inserted along the direction of the guide needle, and the guide needle was pulled out. The vertebral body condition was explored in detail. If the anterior vertebral body ruptured, the expansion balloon was placed in front of 3/4 vertebral bodies, and tilted from the upper right to the lower front; Balloon dilatation was maintained by injecting contrast medium slowly, but the pressure is below 300Pa. If the vertebral reduction effect is good, the balloon can be pulled out, then bone cement was injected, and C-arm X-ray machine was supplemented for continuous monitoring to ensure that it can be fully injected into the vertebral body. Then combined with the bone cement push tube to ram pressure to ensure that it was completely solidified, and the amount of bone cement in each vertebral body was about 1.0-5.0ml [3-4].

2.3. Observation indexes

- (1) Total efficiency. Remarkable efficiency: The fracture healed and the basic symptoms and pain subsided; Efficient: The fracture basically healed and the basic symptoms and pain improved; Inefficient: The above criteria were not met. Total effective rate = remarkable effective rate + effective rate [4].
- (2) Cobb angle and vertebral height.
- (3) Quality of life score. According to the QOL quality of life questionnaire, there are four dimensions, namely society, psychology, body and life. The total score of each score is 100 points, and the score is positively correlated with the quality of life.

2.4. Statistical method

SPSS 23.0 was used in this study. Measurement data was expressed by $\bar{x}\pm s$ and inspected by t ; Count data was expressed by % and inspected by χ^2 ; $P < 0.05$, which proved that the data was more significant.

3. Results

3.1. Total efficiency

In comparison of the total effective rate, 70.00% in the control group < 95.00% in the experimental group, and the data were significant ($P < 0.05$), as shown in **Table 1**.

Table 1. Total effective rate [n, %]

Group	Remarkable effect	Effective	Inefficient	Total effective rate
Control group / n = 20	6(30.00)	8(40.00)	6(30.00)	14(70.00)
Experimental group / n = 20	16(80.00)	3(15.00)	1(5.00)	19(95.00)
X ² value				4.3290
P				0.0374

3.2. Cobb angle and vertebral height

In comparison of the Cobb angle and vertebral body height, the values before treatment were similar, and the data comparison was insignificant ($P > 0.05$); However, after treatment, the values of the control group were worse than those of the experimental group, and the data was more significant ($P < 0.05$), as shown in **Table 2**.

Table 2. Cobb angle and vertebral height [$\bar{x} \pm s$]

Group	Cobb angle (°)		Vertebral body height (mm)	
	Before treatment	After treatment	Before treatment	After treatment
Control group / n = 20	8.08±0.73	10.29±0.60	60.09±5.34	55.30±6.45
Experimental group / n = 20	8.22±0.84	7.80±0.51	59.62±5.62	67.60±6.58
t value	0.5626	14.1411	0.2711	5.9699
P	0.5770	0.0000	0.7878	0.0000

3.3. Quality of life score

In comparison of the quality-of-life score, the scores before treatment were similar, and the data comparison was insignificant ($P > 0.05$); The scores after treatment were higher than before, and the data were more significant ($P < 0.05$), as shown in **Table 3**.

Table 3. Quality of life score [$\bar{x} \pm s$, points]

Index		Control group / n = 20	Experimental group / n = 20	t value	P
Social function	Before treatment	50.22±2.02	50.21±2.09	0.0154	0.9878
	After treatment	53.35±3.49	64.97±4.90	8.6383	0.0000
Psychological function	Before treatment	45.61±2.86	45.59±2.25	0.0246	0.9805
	After treatment	48.69±3.72	67.92±5.15	13.5367	0.0000
Physical function	Before treatment	43.59±2.05	43.28±2.03	0.4805	0.6336
	After treatment	46.95±3.57	61.76±4.64	11.3132	0.0000
Life state	Before treatment	40.33±2.31	40.23±2.38	0.1348	0.8935
	After treatment	41.73±3.40	60.46±3.53	17.0906	0.0000

4. Discussion

With the advent of an aging society, the number of basic diseases in these groups has increased year by year. Osteoporosis is an age-related disease in the department of orthopedics. The incidence rate of it will increase with age. According to different etiology, osteoporosis can be divided into primary, secondary and idiopathic, but primary is a common type. According to the statistics of existing literature, there are about

200 million people over 60 years old in China, accounting for 15.5%; and 150 million people over 65 years old, accounting for 10.1%, which is also the country with the highest proportion of the elderly in the world. Osteoporotic vertebral compression fracture, referred to as OVCF, is a common and severe complication of osteoporosis group. It refers to the phenomenon of lumbar fracture in mild violence and daily life under stress concentration. However, most of them are thoracolumbar spine, accounting for more than 90% of vertebral fractures, which will not only increase physical pain, but also hinder their daily life and exercise. During this period, due to the constraints of medical technology, doctors and patients' concepts in some hospitals, they still tend to conservative treatment, such as bed rest, external fixation, analgesia and rehabilitation exercise. However, due to the particularity of patients, it is difficult to achieve the expected effect, leaving many sequelae and hindering the recovery of prognosis ^[5-6].

Although the therapeutic effect of vertebroplasty is better, it has high requirements for the type of fracture. It will not only aggravate the injury of body tissue, but also face postoperative complications, which is difficult to accept by patients. Kyphoplasty is a new medical technology developed on the premise of traditional vertebroplasty. Through the use of balloons, it can gradually expand the vertebral body, broaden the bone cement perfusion area, avoid leakage, reduce the risk of pulmonary embolism / venous embolism, and has high safety. Especially in the groups with ineffective conservative treatment of osteoporotic vertebral compression fracture, CT and X-ray examination can accurately explore the fracture site and adjust the treatment plan. That is, the treatment scheme has the following advantages: Pre-implantation of balloons to expand the vertebral body can create sufficient space for bone cement injection and avoid the risk of operation caused by leakage; Tamping operation after bone cement injection can avoid subsequent vertebral collapse, disease deterioration and other events. However, in this process, because the balloon expands in the direction of small resistance, it is not conducive to control the shape of the cavity in the vertebral body, and the operability is low. If the technology is not standardized, it will face the risk of balloon rupture ^[7].

Bone cement is the primary filler in the treatment of kyphoplasty, and it is also the focus of scholars' attention. The details are:

- (1) Type: It includes non-degradable bone cement and degradable bone cement. The former is common polymethyl methacrylate, which has the characteristics of short time and high polymerization heat production. The latter is common calcium phosphate bone cement, which has relatively loose operation time and relatively low polymerization heat production.
- (2) Mechanism of action: It is beneficial to restore the original height and integrity of the vertebral body and promote fracture healing; Heat generated during polymerization reaction will damage vertebral nerve endings and have analgesic effect. Monomer bone cement destroys the original nerve fiber conduction with cytotoxicity.
- (3) Viscosity: Low viscosity bone cement has the characteristics of high permeability and high fluidity. It diffuses rapidly, but it is easy to face the leakage of fracture / bone wall defect, so it should be injected under low pressure. High viscosity bone cement can reach a high setting state in a very short time, prolong the injection time, and the polymerization heat production is low, reducing the damage to vertebral tissues, but it has high requirements for injection pressure ^[8].

In conclusion, in the treatment of patients with osteoporotic vertebral compression fracture, both conservative treatment and kyphoplasty can play a therapeutic effect, but the latter is effective, safe and reliable, and has good quality of life. Thus, it can be popularized.

Disclosure statement

The author declares no conflict of interest.

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