

## Clinical analysis of bone cement vertebroplasty for patients with spinal metastasis

HUANG WENZE, LIU LIANG<sup>△</sup>

Department of Spinal Surgery, Huangshi Central Hospital of Eastern Hubei Medical Group (Affiliated Hospital of Hubei Institute of Technology), Huangshi Hubei 435000, China

**【Abstract】 Objective:** To investigate the clinical effect of bone cement vertebroplasty in the treatment of spinal metastasis. **Methods:** From the patients with spinal metastasis admitted to our hospital from January 2020 to January 2022, 104 patients were randomly selected as the study subjects, and were divided into experimental group and control group by random number table method. The number of patients in both groups was 52. The control group was treated with conventional vertebroplasty, and the experimental group was treated with percutaneous kyphoplasty. **Results:** After operation, the VAS score of the experimental group was lower than that of the control group, and the anterior edge height of the vertebral body was higher than that of the control group ( $P < 0.05$ ). In terms of ODI score, the ODI score of the experimental group was higher than that of the control group ( $P < 0.05$ ). In terms of bone cement leakage, the total incidence of the experimental group was 17.30%, and that of the control group was 34.61%, which was statistically significant ( $P < 0.05$ ). **Conclusion:** In the treatment of spinal metastatic tumors, the use of bone cement vertebroplasty has a significant therapeutic effect. At the same time, the use of percutaneous kyphoplasty has a better effect, which can effectively reduce the occurrence of bone cement leakage, improve the patient's body dysfunction, effectively alleviate the patient's pain, and is worthy of clinical promotion and use.

**【Key words】** Spinal metastasis; Bone cement vertebroplasty; clinical analysis

In recent years, with the rapid development of China's social economy and the accelerated pace of urbanization, due to the influence and role of various factors, the incidence rate of malignant tumor diseases in China has increased year by year[1]. Among malignant tumor diseases, the best place is the spine, in which the cervical vertebra, thoracic vertebra and lumbar vertebra are the most common, while most primary tumors are breast cancer and lung cancer[2]. In clinical practice, the most obvious symptom of patients with spinal metastasis is pain. Some patients with severe disease will have pathological fractures, which will not only damage the patient's health, but also seriously affect the patient's quality of life. In the past clinical treatment, conservative treatment was mainly used, but this treatment could not effectively reduce the pain of patients, and was very unfavorable for the reconstruction of spinal stability[3]. While bone cement vertebroplasty, in the current treatment of spinal metastasis disease, has a good therapeutic effect and can effectively control the progress of local tumors. At the same time, this treatment method is also one of the treatment schemes that are widely used in clinical practice[4]. However, in view of the lack of clinical reports on the treatment of spinal metastases

with cement-based vertebroplasty, it is unable to provide effective theoretical support for clinical practice. To this end, this article analyzes the clinical value of bone cement vertebroplasty in the treatment of patients with spinal metastasis by discussing the clinical effect. The specific contents are as follows.

## 1. Data and methods

### 1.1 Baseline data

From the patients with spinal metastasis admitted to our hospital from January 2020 to January 2022, 104 patients were randomly selected as the study subjects, and were divided into experimental group and control group by random number table method. The number of patients in both groups was 52. The control group was treated with conventional vertebroplasty, and the experimental group was treated with percutaneous kyphoplasty. Among the 52 patients in the control group, there were 32 male patients and 20 female patients, with the minimum age of 33 years, the maximum age of 78 years, and the average age of  $(52.22 \pm 4.74)$  years; Among the 52 patients in the experimental group, there are 30 male patients and 22 female patients. The minimum age is 32 years old, the maximum age is 76 years old, and the average age is  $(52.38 \pm 4.85)$  years old. Compared with the baseline data of the two groups, the difference between the two groups was small and statistically insignificant ( $P > 0.05$ ).

Inclusion criteria: 1. The clinical diagnosis results were consistent with the clinical diagnosis criteria of spinal metastasis; 2. Clinical data are complete and complete; 3. No contraindication of operation, clear consciousness; 4. They all knew about the study and signed the informed consent form.

Exclusion criteria: 1. cognitive dysfunction, coagulation dysfunction; 2. Poor compliance, bone cement allergy; 3. Accompanied by serious mental illness; 4. The clinical data are missing and incomplete.

### 1.2 Method

The control group was treated with conventional vertebroplasty: taking prone position, keeping the patient's abdomen in the air, and implementing local anesthesia. After percutaneous puncture, the X-ray machine is used to insert the puncture needle from the pedicle of the vertebral body into the anterior and middle part of the patient's body, and then the puncture needle is taken out and put into the working sleeve. Put the adjusted bone cement into the vertebral body through a sleeve. During this period, carefully observe the dispersion of bone cement and control the injection speed to avoid leakage of bone cement. After the bone cement is completely solidified, take out the working sleeve, pull out the puncture needle, conduct local compression hemostasis, and compress the bandage.

The experimental group was treated with percutaneous kyphoplasty: taking prone position, keeping the patient's abdomen in the air, and implementing local anesthesia. After percutaneous puncture, the X-ray machine is used to insert the puncture needle from the pedicle of the vertebral body into the anterior and middle part of the patient's body, and then the puncture needle is taken out and put into the working sleeve. A balloon is placed along the sleeve to expand and expand the vertebral body, thus accelerating the reduction of the vertebral body and reducing the leakage of bone cement. After that, take out the balloon, insert the adjusted bone cement, and after the bone cement is completely solidified, take out the sleeve for hemostasis and bandage.

### 1.3 Observation indicators

The VAS score, anterior edge height of vertebral body, ODI score and bone cement leakage were compared between the two groups. The ODI score (Ostry Dysfunction Index) mainly includes sleep, social activity, standing, walking, living ability and other contents. The total score of each item is 5 points. The higher the score, the more serious the dysfunction of the patient's body.

### 1.4 Statistical analysis

SPSS22.1 software is used to process and analyze the data. The measurement data is expressed by the mean standard deviation ( $\bar{x}\pm s$ ), and the counting data is expressed by  $x^2$ , and tested by  $t$ . When  $P$  is less than 0.05, the difference is statistically significant.

## 2. Results

### 2.1 Compare the VAS score and anterior edge height of vertebral body between the two groups

Compared with the two groups, before operation, the VAS score and the height of the anterior edge of the vertebral body of the two groups had little difference, and there was no statistical significance ( $P>0.05$ ); After operation, the VAS score of the experimental group was lower than that of the control group, and the anterior edge height of the vertebral body was higher than that of the control group, with statistical significance ( $P<0.05$ ), as shown in Table 1.

Table 1: VAS score and anterior edge height of vertebral body ( $\bar{x}\pm s$ ) of two groups of patients

group	Number of cases	VAS score (points)		Front edge height of vertebral body (mm)	
		Preoperative	Postoperative	Preoperative	Postoperative
experimental group	52	6.62±1.89	1.82±0.67	24.22±5.35	32.03±4.28
control group	52	6.61±1.85	2.32±1.03	24.18±5.27	26.04±3.85
T value	-	0.027	2.934	0.038	7.503
P value	-	0.978	0.004	0.969	0.000

### 2.2 Compare the ODI scores of two groups of patients

Compared with the two groups, in terms of ODI scores, there was little difference between the two groups before operation, and there was no statistical significance ( $P>0.05$ ); The ODI score of the experimental group was significantly higher than that of the control group ( $P$ ).

Table 2: ODI score of two groups of patients ( $\bar{x}\pm s$ )

group	Number of cases	Preoperative	3 days after operation	30 days after operation	90d after operation
experimental group	52	47.02±3.02	31.52±3.23	28.35±4.12	25.34±3.45

control group	52	47.01±3.05	45.34±4.38	40.02±3.88	31.09±4.27
t value	-	0.016	18.312	14.869	7.553
P value	-	0.986	0.000	0.000	0.000

### 2.3 Compare the leakage of bone cement between the two groups

Compared with the two groups, the total incidence of bone cement leakage in the experimental group was 17.30% (9/52), and that in the control group was 34.61% (18/52), which was statistically significant ( $P < 0.05$ ), as shown in Table 3.

Table 3: Leakage of bone cement in two groups of patients

group	Number of cases	Type I	Type II	Type III	Type IV	Total incidence
experimental group	52	4 (7.69)	3 (5.76)	2 (3.84)	0 (0.00)	9 (17.30)
control group	52	4 (7.69)	4 (7.69)	8 (15.38)	2 (3.84)	18 (34.61)
X <sup>2</sup> value	-	-	-	-	-	4.051
P value	-	-	-	-	-	0.044

### 3. Discussion

With the development of social economy, in recent years, the incidence rate of malignant tumor diseases in China has shown an increasing trend year by year, and the incidence of spinal metastases has increased significantly[5]. The occurrence of spinal metastasis disease will cause the patient's body to have autonomic dysfunction, activity dysfunction, pain and sensory dysfunction[6]. Through clinical research, it was found that the severity of these conditions was closely related to the degree of fracture damage, tumor reproduction speed, nerve compression and systemic diseases. In a short time, the tumor in the patient's body will grow rapidly, which will aggravate the symptoms of the patient's body, while the bone damage will lead to the production of soluble tumor, which will lead to a series of adverse reactions in the body, such as pathological deformity, fracture, etc. In addition, spinal metastasis will also compress the patient's spinal cord and increase the load of nerve roots, thus causing nerve root disease and spinal cord disease[7]. After the disease, most patients will have symptoms of varying degrees, such as weight loss, loss of appetite and even organ failure. If the disease is mild, it will affect the patient's physical and mental health and quality of life; If the disease is serious, it will endanger the patient's life safety[8].

In view of this, in the clinical treatment of spinal metastasis, the selection of treatment plan must have the characteristics of safety, effectiveness and rationality, to ensure that patients can effectively improve their prognosis and improve their quality of life after receiving treatment[9]. In the previous treatment schemes, most of them are based on open vertebroplasty. However, due to the patient's physical factors and the limitations of

the operation itself, the application effect of open vertebroplasty in the treatment of spinal metastasis is not good. In addition, open surgery itself is more traumatic and takes a long time. During the operation, patients are vulnerable to some adverse conditions, such as massive bleeding, which is not conducive to the recovery of patients after surgery. It can be seen that its clinical application value is low in terms of surgical safety, surgical effectiveness, and the cost of surgery. At the same time, most patients can not afford the treatment cost of this operation economically, which ultimately leads to the general low acceptance of the patients of this operation[10].

In recent years, with the development of medical technology and the popularization of minimally invasive technology, bone cement vertebroplasty has gradually been used in clinical practice to treat spinal metastases[11]. Bone cement vertebroplasty uses imaging methods to clearly explore the lesion site of the patient, and adjusts the surgical plan according to the exploration results, greatly improving the accuracy and pertinence of the operation. At present, bone cement vertebroplasty has been widely used in clinic due to its prominent therapeutic advantages, wide application scope and less restrictive factors. At the same time, the use of bone cement vertebroplasty to treat spinal metastasis can effectively control the degree of pain of patients during the treatment, and avoid aggravating the pain of patients due to pathological fracture, periosteal nerve fiber traction, tumor tissue infiltration into the epidural space and other factors[12].

The results showed that before operation, there was little difference in VAS score and anterior edge height of vertebral body between the two groups ( $P>0.05$ ); After operation, the VAS score of the experimental group was lower than that of the control group, and the anterior edge height of the vertebral body was higher than that of the control group, with statistical significance ( $P<0.05$ ). In terms of ODI score, there was little difference between the two groups before operation ( $P>0.05$ ); The ODI score of the experimental group was significantly higher than that of the control group at 3 days, 30 days and 90 days after operation ( $P<0.05$ ). In terms of bone cement leakage, the total incidence of the experimental group was 17.30%, and that of the control group was 34.61%, which was statistically significant ( $P<0.05$ ). From the results, it can be seen that the overall effect of percutaneous kyphoplasty is better. It not only significantly improves the dysfunction of the patient's body, but also reduces the incidence of bone cement leakage, which is more conducive to the recovery of the patient's prognosis, both in terms of stability, safety and effectiveness.

To sum up, in the treatment of spinal metastasis, the use of bone cement vertebroplasty has a significant therapeutic effect. At the same time, the use of percutaneous kyphoplasty has a better effect. It can effectively reduce the occurrence of bone cement leakage, improve the patient's body dysfunction, and effectively relieve the patient's pain, which is worthy of clinical promotion and use.

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### 脊柱转移瘤患者采用骨水泥椎体成形术治疗的临床分析

黄文泽, 刘亮<sup>△</sup>

鄂东医疗集团黄石市中心医院（湖北理工学院附属医院）脊柱外科，湖北黄石 435000

**【摘要】目的：**探讨脊柱转移瘤患者采用骨水泥椎体成形术治疗的临床效果。**方法：**从本院于2020年1月至2022年1月间收治的脊柱转移瘤患者中，随机抽选104例患者作为研究对象，以随机数字表法将其分组为实验组与对照组，两组例数均为52例，对照组采用常规椎体成形术，实验组采用经皮椎体后凸成形术。**结果：**术后，实验组在VAS评分方面小于对照组，在椎体前缘高度方面高于对照组（ $P < 0.05$ ）。在ODI评分方面，术后3d、术后30d、术后90d，实验组的ODI评分均高于对照组（ $P < 0.05$ ）。在骨水泥渗漏情况方面，实验组总发生率17.30%，对照组总发生率34.61%，统计学有意义（ $P < 0.05$ ）。**结论：**在脊柱转移瘤的治疗中，应用骨水泥椎体成形术，其治疗效果显著，同时，采用经皮椎体后凸成形术的效果更优，能有效减少骨水泥渗漏情况的发生，改善患者机体功能障碍的情况，有效缓解患者的疼痛，值得临床推广和使用。

**【关键词】** 脊柱转移瘤；骨水泥椎体成形术；临床分析

近几年来，随着我国社会经济的快速发展，在城市化建设加快的步伐下，由于各种因素的影响和作用，导致我国恶性肿瘤疾病的发病率逐年上升<sup>[1]</sup>。在恶性肿瘤疾病中，最好发的部位就是脊柱，其中以颈椎部位、胸椎部位以及腰椎部位最为常见，而大多数原发性肿瘤，以乳腺癌、肺癌较为常见<sup>[2]</sup>。在临床中，脊柱转移瘤患者最显著的症状表现就是疼痛，有些病情较为严重的患者会出现病理性骨折的情况，不仅会损害患者的机体健康，同时还会严重影响患者的生活质量。在以往的临床治疗中，主要采用保守治疗的方式，但是这种治疗方式无法有效的减轻患者的疼痛感，非常不利于重建脊柱的稳定性<sup>[3]</sup>。而骨水泥椎体成形术，在目前的脊柱转移瘤疾病的治疗中，却有良好的治疗效果，能有效控制局部肿瘤的进展，同时，这项治疗方式也是目前临床中应用较为广泛的治疗方案之一<sup>[4]</sup>。但是，鉴于目前临床上缺少骨水泥椎体成形术治疗脊柱转移瘤的有关报告，无法为临床提供有效的理论支持。为此，本文通过探讨脊柱转移瘤患者采用骨水泥椎体成形术治疗的临床效果，分析其临床价值，具体内容如下。

## 1. 资料与方法

### 1.1 基线资料

从本院于2020年1月至2022年1月间收治的脊柱转移瘤患者中，随机抽选104例患者作为研究对象，以随机数字表法将其分组为实验组与对照组，两组例数均为52例，对照组采用常规椎体成形术，实验组采用经皮椎体后凸成形术。其中，在对照组的52例患者中，男性患者32例，女性患者20例，最小年龄33岁，最大年龄78岁，平均年龄（ $52.22 \pm 4.74$ ）岁；在实验组的52例患者中，男性患者30例，女性患者22例，最小年龄32岁，最大年龄76岁，平均年龄（ $52.38 \pm 4.85$ ）岁。对比两组基线资料，组间差异小，统计学无意义（ $P > 0.05$ ）。

**纳入标准：**1、临床诊断结果均符合脊柱转移瘤的临床诊断标准；2、临床资料齐全、完整；3、无手术禁忌证、意识清晰；4、均知晓本次研究且签署知情同意书。

**排除标准：**1、认知功能障碍、凝血功能障碍；2、依从性差、骨水泥过敏；3、伴有严重精神疾病；4、临床资料缺损、不齐全。

### 1.2 方法

**对照组采用常规椎体成形术：**取俯卧位，保持患者腹部悬空，实施局部麻醉。在经皮穿刺后，应用X线机，将穿刺针由椎弓根插入患者机体的椎体前中部，之后，取出穿刺针，放入工作套管中。将调好

的骨水泥，由套管置入椎体内。在此期间，仔细观察骨水泥的弥散情况，同时控制好注射的速度，避免出现骨水泥渗漏的情况。在骨水泥完全固化后，取出工作套管，将穿刺针拔出，进行局部压迫止血，并加压包扎。

实验组采用经皮椎体后凸成形术：取俯卧位，保持患者腹部悬空，实施局部麻醉。在经皮穿刺后，应用 X 线机，将穿刺针由椎弓根插入患者机体的椎体前中部，之后，取出穿刺针，放入工作套管中。沿着套管，置入球囊，使椎体扩张、膨胀，从而加速椎体复位，降低骨水泥发生渗漏的情况。之后，取出球囊，置入调好的骨水泥，待到骨水泥完全固化后，取出套管，进行止血、包扎。

### 1.3 观察指标

比较两组患者的 VAS 评分、椎体前缘高度、ODI 评分、骨水泥渗漏情况。ODI 评分（Owestry 功能障碍指数），主要包括睡眠、社会活动古、站立、行走、生活能力等内容，每项内容总分 5 分，分值越高，则表明患者机体的功能障碍情况越严重。

### 1.4 统计学分析

采用 SPSS22.1 软件对数据进行处理和分析，计量资料，采用均数标准差（ $\bar{x}\pm s$ ）表示，计数资料，采用  $\chi^2$  表示，用 t 进行检验，当 P 小于 0.05 表示差异有统计学意义。

## 2. 结果

### 2.1 比较两组患者的 VAS 评分、椎体前缘高度

两组对比，术前，两组患者的 VAS 评分、椎体前缘高度差异小，统计学无意义（ $P>0.05$ ）；术后，实验组在 VAS 评分方面小于对照组，在椎体前缘高度方面高于对照组，统计学有意义（ $P<0.05$ ），见表 1。

表 1：两组患者的 VAS 评分、椎体前缘高度（ $\bar{x}\pm s$ ）

组别	例数	VAS 评分（分）		椎体前缘高度（mm）	
		术前	术后	术前	术后
实验组	52	6.62±1.89	1.82±0.67	24.22±5.35	32.03±4.28
对照组	52	6.61±1.85	2.32±1.03	24.18±5.27	26.04±3.85
t 值	-	0.027	2.934	0.038	7.503
P 值	-	0.978	0.004	0.969	0.000

### 2.2 比较两组患者的 ODI 评分

两组对比，在 ODI 评分方面，术前，两组 ODI 评分差异小，统计学无意义（ $P>0.05$ ）；术后 3d、术后 30d、术后 90d，实验组的 ODI 评分均高于对照组，统计学有意义（ $P<0.05$ ），见表 2。

表 2：两组患者的 ODI 评分（ $\bar{x}\pm s$ ）

组别	例数	术前	术后 3d	术后 30d	术后 90d
实验组	52	47.02±3.02	31.52±3.23	28.35±4.12	25.34±3.45
对照组	52	47.01±3.05	45.34±4.38	40.02±3.88	31.09±4.27
t 值	-	0.016	18.312	14.869	7.553
P 值	-	0.986	0.000	0.000	0.000

### 2.3 比较两组患者的骨水泥渗漏情况

两组对比, 在骨水泥渗漏情况方面, 实验组总发生率 17.30% (9/52), 对照组总发生率 34.61% (18/52), 统计学有意义 ( $P < 0.05$ ), 见表 3。

表 3: 两组患者的骨水泥渗漏情况

组别	例数	I 型	II 型	III 型	IV 型	总发生率
实验组	52	4 (7.69)	3 (5.76)	2 (3.84)	0 (0.00)	9 (17.30)
对照组	52	4 (7.69)	4 (7.69)	8 (15.38)	2 (3.84)	18 (34.61)
X <sup>2</sup> 值	-	-	-	-	-	4.051
P 值	-	-	-	-	-	0.044

### 3. 讨论

随着社会经济的发展, 近几年来, 我国恶性肿瘤疾病的发病率呈现出逐年递增的趋势, 而脊柱转移瘤的发生率增长更为明显<sup>[5]</sup>。脊柱转移瘤疾病的发生, 会致使患者的身体出现自主性功能障碍、活动性功能障碍、疼痛以及感觉障碍等不良情况<sup>[6]</sup>。经临床研究发现, 这些情况的严重程度, 和患者骨折损坏程度、肿瘤生殖速度、神经压迫情况以及系统性疾病等因素有着米钱的关联。在短时间内, 患者身体内的肿瘤会快速增长, 从而加重患者机体的症状, 而骨质的损害, 又会引发溶解性肿瘤的产生, 进而导致机体出现一系列不良的反应, 如病理性畸形、骨折等等。除此之外, 脊柱转移瘤还会压迫病人身体的脊髓, 加重神经根的负荷, 从而引发神经根疾病和脊髓疾病等<sup>[7]</sup>。大多数病人在患病后, 都会出现不同程度的症状表现, 如日渐消瘦、食欲减退甚至是器官衰竭等等。若病情程度较轻, 则会影响患者的身心健康以及生活质量; 若病情程度较重, 则会危及患者的生命安全<sup>[8]</sup>。

鉴于此, 在脊柱转移瘤的临床治疗中, 治疗方案的选定, 必须具有安全性、有效性、合理性的特征, 要确保患者在接受完治疗后, 能够有效改善其预后效果, 提升其生活质量<sup>[9]</sup>。在以往的治疗方案中, 大多数方案都是以开放性椎体成形术为主, 但是, 由于患者身体因素以及手术自身的局限性, 导致开放性椎体成形术在脊柱转移瘤疾病的治疗中的应用效果欠佳。除此之外, 开放性手术本身的创伤性较大, 手术耗时较长, 在手术过程中, 患者极易出现一些不良情况, 如大出血等, 非常不利于患者术后的恢复。由此可见, 不论从手术安全性、手术有效性, 还是从手术的耗资方面, 其临床应用的价值都较低, 同时, 大多数患者在经济上也无法负荷这项手术的治疗费用, 最终导致该项手术的患者接受度普遍偏低<sup>[10]</sup>。

近年来, 随着医疗技术的发展, 微创技术的普及, 在临床中逐渐开始应用骨水泥椎体成形术来治疗脊柱转移瘤疾病<sup>[11]</sup>。骨水泥椎体成形术, 利用影像学手段, 清晰探查患者病变的部位, 根据探查结果, 调整手术方案, 极大提升了手术的精准性和针对性。目前, 骨水泥椎体成形术, 凭借着突出的治疗优势、广泛的适用范围以及较少的局限性因素已在临床中广泛应用。同时, 利用骨水泥椎体成形术治疗脊柱转移瘤, 能够在治疗期间, 有效控制患者的疼痛程度, 避免患者因病理性骨折、骨膜神经纤维牵拉以及肿瘤组织向硬膜外浸润等因素而加重疼痛感<sup>[12]</sup>。

本文结果显示: 术前, 两组患者的 VAS 评分、椎体前缘高度差异小, 统计学无意义 ( $P > 0.05$ ); 术后, 实验组在 VAS 评分方面小于对照组, 在椎体前缘高度方面高于对照组, 统计学有意义 ( $P < 0.05$ )。在 ODI 评分方面, 术前, 两组 ODI 评分差异小, 统计学无意义 ( $P > 0.05$ ); 术后 3d、术后 30d、术后 90d, 实验组的 ODI 评分均高于对照组, 统计学有意义 ( $P < 0.05$ )。在骨水泥渗漏情况方面, 实验组总发生率 17.30%, 对照组总发生率 34.61%, 统计学有意义 ( $P < 0.05$ )。从各项结果中可看出, 经皮

椎体后凸成形术的治疗整体效果更优，不仅显著改善患者机体的功能障碍情况，还能降低骨水泥渗漏的发生率，更有利于患者的预后恢复，不论是稳定性、安全性还是有效性都更佳。

综上所述，在脊柱转移瘤的治疗中，应用骨水泥椎体成形术，其治疗效果显著，同时，采用经皮椎体后凸成形术的效果更优，能有效减少骨水泥渗漏情况的发生，改善患者机体功能障碍的情况，有效缓解患者的疼痛，值得临床推广和使用。

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