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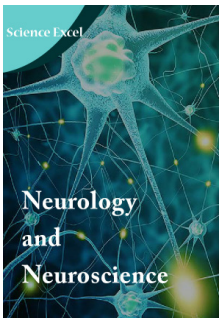

Retrospective Study of 42 Patients Undergoing Vertebroplasty in 2023-2024

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Abstract

Vertebroplasty is a minimally invasive procedure widely used for the treatment of vertebral fractures, particularly in patients with osteoporotic fractures and metastatic tumor infiltration. This study aimed to evaluate the clinical outcomes of vertebroplasty in 42 patients treated between 2023 and 2024. The analysis included variables such as fracture types, the number of treated vertebrae, and postoperative complications. The results indicated a significant reduction in pain, but with an incidence of complications such as segment loss and secondary fractures.

Introduction

Vertebroplasty is a minimally invasive procedure used to treat vertebral fractures, particularly in patients with osteoporosis and metastatic tumor infiltration. Osteoporosis, which primarily affects the elderly, is one of the leading causes of vertebral fractures due to decreased bone density and fragility of the vertebrae [1]. This type of fracture can cause intense pain, functional limitations, and increased morbidity, which justifies the search for effective therapeutic alternatives. Vertebroplasty aims to restore vertebral integrity by injecting cement into the fractured vertebral body, with the goal of stabilizing the fracture and relieving pain [2].

In the context of metastatic tumor infiltration, such as in breast, prostate, or lung cancer metastases, vertebroplasty has proven to be an effective therapeutic option for pain relief and quality of life improvement [3]. However, the literature still presents discrepancies regarding the long-term efficacy of the procedure and associated risks. The potential for secondary fractures in adjacent vertebrae is a discussed complication, with some studies suggesting an increased risk of secondary fractures after treatment [4,5].

Studies also indicate that vertebroplasty can significantly improve initial pain symptoms, but its impact on preventing future fractures is more controversial. Cihan et al. [4] and Choi et al. [5] observed that, although immediate pain relief is notable, the biomechanics of the spine may change after the procedure, which could predispose to new fractures. Additionally, complications such as cement leakage and deterioration of neurological function are critical issues that need to be monitored [6].

Objective

To evaluate the clinical outcomes and complications associated with vertebroplasty in patients with osteoporotic fractures and metastatic tumor infiltrations treated between 2023 and 2024, with emphasis on pain reduction, occurrence of new fractures, and cement leakage.

Methodology

This retrospective study included 42 patients who underwent vertebroplasty between 2023 and 2024. The analysis considered the number of vertebrae treated, pain intensity (measured by the Visual Analog Scale - VAS) before and after the procedure, postoperative complications such as cement leakage and secondary fractures, and the occurrence of new neurological symptoms.

Efficacy was assessed by the reduction in VAS, while complications were monitored through clinical and imaging examinations. Follow-up was conducted every 15 days after the intervention.

Results

Among the 42 cases analyzed, the average age was 70.35 years, with a predominance of female patients (76.2%). The sample was predominantly composed of patients with osteoporotic fractures (78.6%) and metastatic tumor infiltrations (21.4%) (Table 1).

In the surgical procedure, after the injection needle was inserted into the vertebral body, confirmed by fluoroscopy imaging, a 360°

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Table 1. *Characteristics of the sample of patients undergoing vertebroplasty*

Characterstics	Value
Number of patients	42
Study period	2003-2004
Average age	70.35 years
Female sex	76.20%
Types of fractures • Osteoporotic fractures • Metastatic tumor inflitrations	 78.60% 21.40%

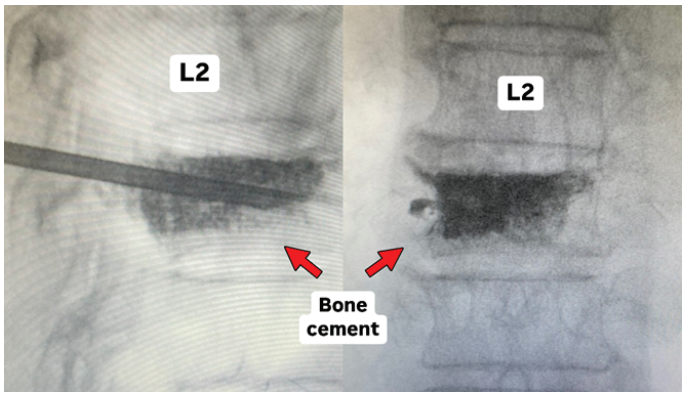

Figure 1. *Intraoperative fluoroscopy image showing, in profile and anteroposterior views, bone cement injection at the level of L3 vertebra.*

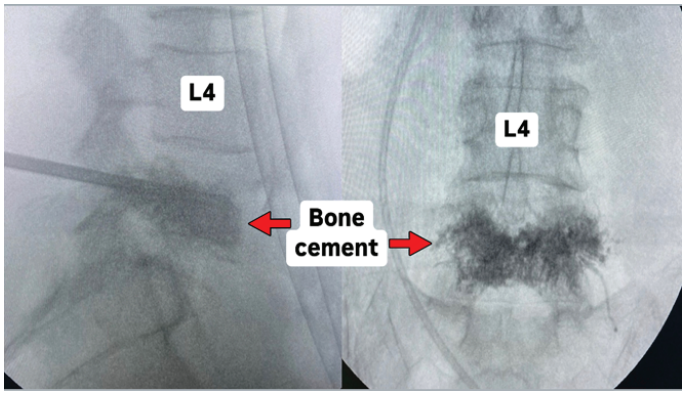

Figure 2. *Intraoperative fluoroscopy image showing, in profile and anteroposterior views, bone cement injection at the level of L5 vertebra.*

rotation of the needle was performed during the bone cement injection to fully fill the vertebral body (Figures 1 and 2).

A significant improvement in pain intensity was observed, with a preoperative average VAS score of 9.42, reducing to 3.83 after 15 days of follow-up. The distribution of the number of treated vertebrae was variable: 50% of patients had one vertebra treated, 24% had two, 9.5% had three, 9.5% had five, 4% had four, and 2.3% had six vertebrae treated (Table 2).

Regarding complications, 14% of patients experienced segment loss, while 4.7% had cement leakage (Figure 3). Secondary fractures in adjacent segments occurred in 4.7% of cases.

Table 2. *Pain intensity and number of vertebrae treated after vertebroplasty*

Characterstics	Value
VAS pre-operative score	9.42
VAS pre-operative score (15 days follow-up)	3.83
No of vertebrae treated • One vertebrae • Two vertebrae • Three vertebrae • Four vertebrae • Five vertebrae • Six vertebrae	 50% 24% 9.50% 9.50% 4% 2.30%

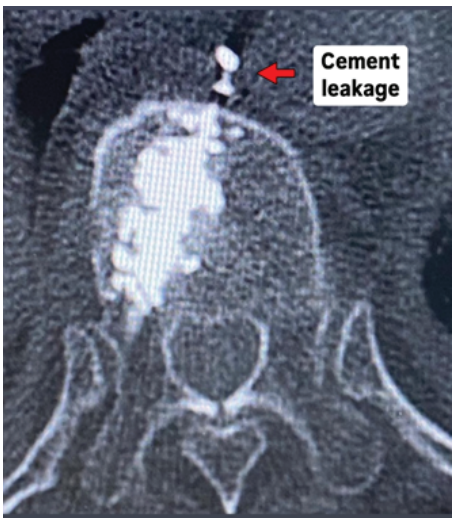

Figure 3. *Postoperative CT scan, bone phase in the axial cut at the thoracic level, showing extravasation of bone cement.*

Table 3. *Post-operative complications after vertebroplasty*

Characteristic	Value
Segment loss	14%
Cement leakage	4.7%
Secondary fractures in adjacent segments	4.7%
Worsening or new neurological symptoms	2.3%
Little or no improvement	3 patients (7.1%)
- Secondary fractures due to metastasis	2 patients (4.7%)
- 94-year-old patient with osteoporotic fracture	1 patient (2.3%)

One patient (2.3%) experienced worsening or new neurological symptoms after the intervention. Three patients showed little or no improvement, two of whom had secondary fractures due to metastasis and one 94-year-old frail patient with an osteoporotic fracture (Table 3).

Discussion

Vertebroplasty has been shown to be effective in relieving pain associated with vertebral fractures, particularly in patients with osteoporosis, as demonstrated by the results of this study, with a significant reduction in postoperative VAS scores [7]. The literature suggests that vertebroplasty for osteoporotic fractures can provide substantial pain relief, but with variations

in outcomes depending on individual patient factors and fracture characteristics [8,9]. The procedure's efficacy for patients with osteoporosis is widely recognized, especially when performed at early stages of vertebral fractures [10].

Regarding complications, the study observed a cement leakage rate of 4.7%, which is within the rates reported in the literature but still requires vigilance and caution [11]. Secondary fractures, observed in 4.7% of cases, are a well-documented complication that can occur due to the increased rigidity of treated vertebrae [12,13]. Additionally, the occurrence of new neurological symptoms was rare (2.3%), in line with previous studies indicating that severe neurological complications after vertebroplasty are rare but possible [14].

Previous studies, such as those by Cihan et al. [4], suggest that the risk of secondary fractures may be elevated, particularly in patients with advanced osteoporosis and older age. The change in spinal biomechanics after treatment, by stabilizing fractured vertebrae, may predispose to an increased risk of fractures in adjacent segments [4,5]. Literature reviews suggest that vertebroplasty can be an effective treatment for osteoporotic fractures, but appropriate patient selection and rigorous postoperative monitoring are essential to reduce complications such as secondary fractures and cement leakage [15,16].

The implementation of anti-osteoporotic treatments to prevent subsequent fractures is recommended by several studies [17]. Furthermore, the need for more randomized controlled trials to clarify the relationship between vertebroplasty and incidental fractures was also highlighted [18].

Conclusion

The study demonstrated that vertebroplasty is effective in reducing pain in patients with osteoporotic vertebral fractures and metastatic tumor infiltrations, with a significant decrease in the postoperative VAS score. However, complications such as segment loss, cement leakage, and secondary fractures were observed, highlighting the need for rigorous monitoring. The complication rate was consistent with the literature, although the occurrence of new neurological symptoms was rare. Vertebroplasty proves to be a valuable option but requires careful patient selection and postoperative monitoring to minimize risks.

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