

## Better Outcome after Balloon Kyphoplasty when Compared to Vertebroplasty. Analysis of the Results of a Single Center with a 2 Year Follow up

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**Abstract— Introduction:** Vertebroplasty means the percutaneous introduction of polymethyl methacrylate into the vertebral bodies that have been weakened by osteoporosis or tumors. Many studies presenting the clinical experience with vertebroplasty and balloon kyphoplasty have been published in recent years. Some authors have reported a higher incidence of new fractures after balloon kyphoplasty and vertebroplasty. The natural course of osteoporosis progression, on the other hand, increases the risk of new fractures, increasing the total number of vertebral fractures.

The Indications are: Vertebral compression fractures; Osteoporotic fractures; Metastatic bone tumors and the contraindications are: Infection of the fractured vertebra; Acute hemorrhagic diathesis; Known allergy to cement; Pregnancy

**Purpose:** Our aim was to make a comparative analysis of the results after balloon kyphoplasty and vertebroplasty in patients with osteoporotic fractures of the thoracolumbar spine.

**Conclusion:** Despite the statistically insignificant number of patients included in our series, our results emphasize the superiority of balloon kyphoplasty over vertebroplasty. The lack of complications and the immediate verticalization of our patients immediately after the end of the procedure makes us have more confidence in the balloon kyphoplasty procedure

**Keywords—** balloon kyphoplasty, vertebroplasty, fractures, vertebrae

### 1 Introduction

Vertebroplasty means a percutaneous introduction of polymethylmethacrylate in the vertebral bodies, which are weakened by osteoporosis or tumors. This procedure was first performed in 1984 y. by Galibert and Deramond (French neurosurgeon and interventional radiologist from Amiens – France). Their first case has been a hemangioma of C2 and they have injected polymethylmethacrylate through an open approach. Their first report is for 7 patients with hemangiomas of the cervical and lumbar spine and appears in 1977<sup>1</sup>. Another group from Lyon – France reports for their experience in the treatment of the vertebral metastases in 20 patients<sup>2</sup>. In 1990 Galibert reports for widening of the percutaneous application of bone cement in osteoporotic fractures and myelomas<sup>3</sup>.

The first reports for the treatment of bigger series of patients with osteoporotic fractures were published in 1977 Jensen<sup>12</sup>. The biomechanical analysis of the augmented with polymethylmetacrylate vertebral segment showed that there is an increased risk for an adjacent segment fracture<sup>23</sup>.

In the last years many studies presenting the clinical experience with vertebroplasty and balloon kyphoplasty were published<sup>24-37</sup>. Some authors report for higher incidence of new fractures after balloon kyphoplasty and vertebroplasty<sup>27-37</sup>. The natural course of progression of osteoporosis on the other hand increases the risk for new fractures increasing the total number of the vertebral fractures<sup>6-11</sup>.

### **Indications**

- The main indications for vertebroplasty or balloon kyphoplasty are:
- Compression vertebral fractures;
- Osteoporotic fractures;
- Methastatic bone tumours;

### **Contraindications**

The main contraindications for vertebroplasty or balloon kyphoplasty are:

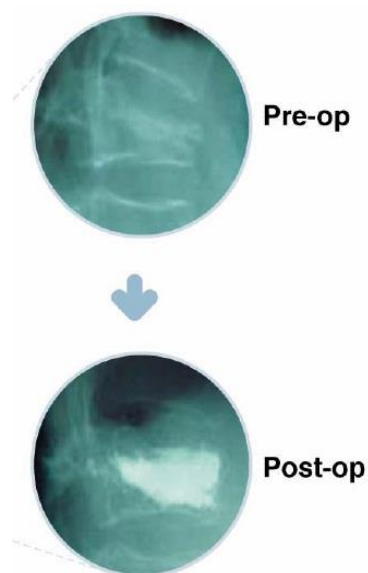
- Infection of the fractured vertebra;
- Acute hemorrhagic diathesis;
- Known allergy to the cement;
- Pregnancy;

### **Aim**

Our aim was to perform a comparative analysis of the results after balloon kyphoplasty and vertebroplasty in patients with osteoporotic fractures of the spine in the thoracolumbar region.

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- MIS spine surgery;
- Fast pain relief;
- Safe introduction of the bone cement;
- Standard transpedicular approach;
- Possibility for a local anesthesia;
- Fast recovery;



## 2. Material and methods

We analyzed our long term results after 37 balloon kyphoplasties for patients with osteoporotic fractures in the thoracolumbar region of the spine for a period of 2 years (2021-2022). In our series only one of the patients was male. In him we did the procedure on 1 level. The remaining 36 patients were women. In 4 of them we performed vertebroplasty and in the remaining 32 our treatment choice was balloon kyphoplasty with proper positioning of the guiding K-wires (Fig. 1). The introduction of the guide wires and the cement tubes is performed percutaneously under the guidance of a C-arm image intensifier (Fig. 2).

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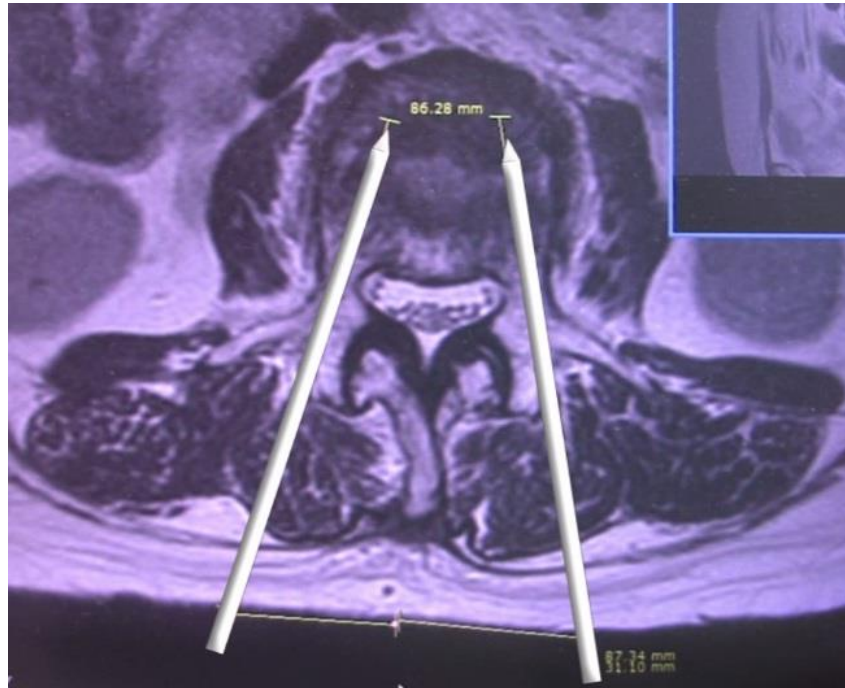


Fig. 1. CT of L3 showing proper positioning of the guiding K-wires

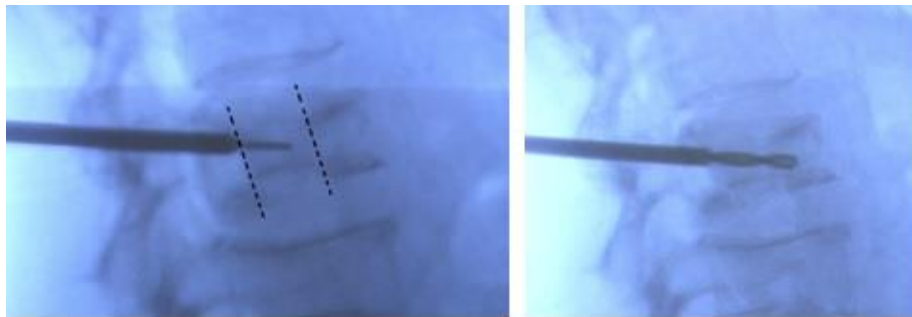


Fig.2. Penetration into the vertebral body and drilling.

In one female patient we simultaneously treated 2 levels of the lumbar spine (Fig. 3).



Fig. 3. Balloon kyphoplasty of L1 and L3 in a female patient with osteoporotic fractures.

The most commonly affected vertebra was L2 (20 patients), after that L1 (10 patients) and L3 (6 patients). In all vertebroplasties we used a vertebroplasty system of the French company Synimed. In the balloon kyphoplasty group we used the Guardian system (South Korea).

### 3. Results

In the vertebroplasty group we had one fatal pulmonary embolism 1 hour after the end of the procedure, in one 82-year-old female patient. In none of the patients from the vertebroplasty group we registered any correction of the kyphosis but we did not register any progression of the deformity either.

In the patients from the balloon kyphoplasty group we registered substantial correction of the kyphotic deformity and the functional outcome was better as well. Despite the data from the literature we did not register any fractures adjacent to the balloon kyphoplasty level.

### 4. Conclusion

Despite the statistically insignificant number of patients included in our series, our results underline the superiority of the balloon kyphoplasty over the vertebroplasty. The

lack of complications and the immediate verticalization of our patients right after the end of procedure pushes us to trust more the balloon kyphoplasty procedure.

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