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**Radiofrequency kyphoplasty: a new method for the treatment of osteoporotic vertebral body compression fractures - a case report**

Licht AW, Kramer W

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# Radiofrequency kyphoplasty: a new method for the treatment of osteoporotic vertebral body compression fractures – a case report

A. W. Licht, W. Kramer

**Abstract:** From January 2005 to December 2008, a total of 148 patients with 205 vertebral fractures were treated with the balloon kyphoplasty system of Medtronic Company at the Asklepios Südpfalzkliniken in Kandel. The outcome of the procedure was favourable. During this period, cement leakages were observed in 27 % of cases, and a pulmonary embolism requiring intervention occurred in one case. Since February 2009, 21 patients with 26 vertebral fractures have been treated by the new radiofrequency kyphoplasty procedure of DFine Company. Very good clinical results have been obtained with this method. **J Miner Stoffwechs 2011; 18 (Supplement 1): 26–28.**

## Introduction

Since the introduction of vertebroplasty which was initially meant to serve as a palliative minimally invasive treatment option for painful vertebral body fractures caused by malignant and benign osteolytic processes [1, 2] in the mid 1980‘s in France by Galibert et al [3], and the subsequent introduction of balloon kyphoplasty at the end of the 1990‘s by M. Reiley, Berkeley, USA [4], both procedures have gained rapid and widespread acceptance in the last few years. In view of the increasing prevalence and incidence of osteoporotic vertebral body fractures, which affects more than 1.4 million persons in the world every year, and the numerous comorbidities associated with this condition [5], the spectrum of indications was recently extended to include osteoporotic and traumatic vertebral body fractures of the types A1.1, A1.2, A1.3 and A3.1 according to Magerl‘s classification [6–10]. In conjunction with additional dorsal and/or ventral instrumentation, even distraction fractures of this classification are now being treated by this approach.

Conceptually, however, vertebroplasty and kyphoplasty have evolved separately and in different directions. Kyphoplasty has now acquired a larger market share. In addition to reducing pain in about 90% of cases [11], which is not significantly different from the effect of vertebroplasty, kyphoplasty offers the advantage of potential targeted reduction of compression fractures with partial restoration of the original height of the vertebral body and reduction of the kyphosis angle [12, 13]. Cement leakage and its local and systemic complications [14, 15] are observed less frequently because of the higher viscosity of the employed cements.

Although a monopoly existed just a few years ago as regards the manufacture of this product, a larger number of manufacturers now offer kyphoplasty systems. A wide range of products have been designed to fulfill the requirements of a kyphoplasty procedure in different ways.

However, according to the present author, the essential requirements of all procedures remain the following:

1. Reliable reduction of pain
2. Avoidance of complications related to the access [12]
3. Reduction of the risk of cement leakage and its complications, such as direct damage to adjacent structures or the spinal cord itself [15], embolism [14], or thermic-toxic damage [16, 17] due to exothermic polymerizing cements based on polymethylmethacrylate (PMMA)
4. The possibility of targeted straightening of impacted vertebral bodies [18]
5. Avoidance of:
   a) primary loss of correction: for instance, the constructed cavity was observed to collapse after deflation of the balloon when balloon-assisted systems are used
   b) secondary loss of height relating to the connective tissue interface at the junction between cement and cancellous bone or due to infractions of non-stabilized regions of the vertebral body [19]

## Case Report

The illustrations show a 72-year-old woman with a lumbar spine syndrome of 6 weeks‘ duration. The patient was unable to recall any trauma to the spine. The fracture in the eleventh thoracic vertebra initially remained undetected on conventional X-rays (Figure 1). Persistent therapy-resistant back pain eventually led to the identification of a recent dorsal plate impression fracture of the A1.2 type on magnetic resonance tomography (Figure 2).

Radiofrequency kyphoplasty was performed in local anesthesia and sedoanalgesia by a puncture in the vertebra with a 13-G hollow needle through a left-sided unilateral transpedicular access. The biphasic cement was prepared prior to puncture and

From the Clinic of Traumatology, Asklepios-Südpfalz Clinic, Kandel, Germany
**Correspondence address:** Andreas W. Licht, MD, Klinik für Unfallchirurgie, Asklepios-Südpfalzkliniken, Luitpoldstrasse 14, D-76870 Kandel;
E-Mail: a.licht@asklepios.com

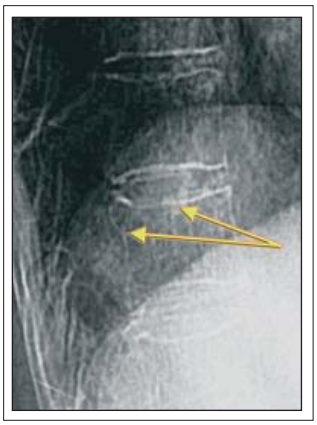

**Figure 1:** Impression of the dorsal plate of the eleventh thoracic vertebra – X-ray taken immediately after the onset of symptoms.

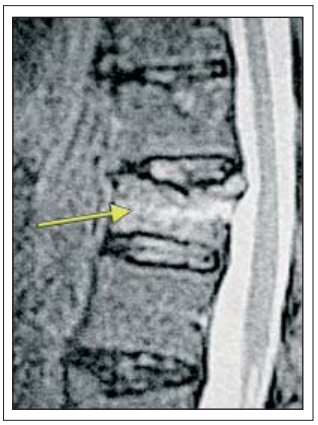

**Figure 2**: The fracture in the eleventh thoracic vertebra on MRT four weeks later

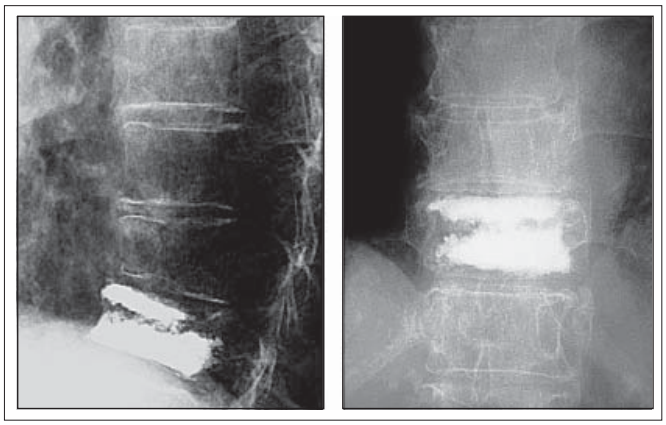

**Figure 4:** Postoperative control X-ray: gain in the height of the eleventh thoracic vertebra, distribution of cement, and the absence of extravasation.

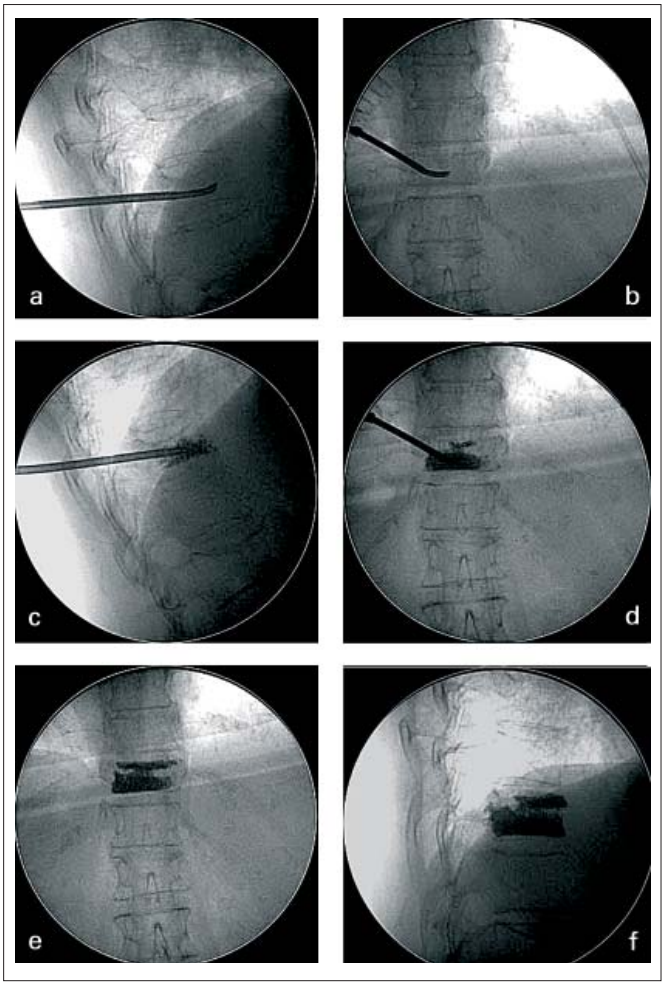


**Figure 3:** The course of surgery: **(a, b)**: Creation of a cavity with a flexible curette, **(c, d)**: Augmentation procedure, **(e, f)**: Final outcome after radiofrequency kyphoplasty

could be applied immediately after creation of a cancellous bone base using the flexible curette (Figure 3 a, b) and connecting the activation element to the puncture cannula.

The following features are clearly visible on the photographs: good distribution of cement in the weakened portions of cancellous bone [20] (Figure 3c, d), marked elevation of the dorsal plate, and the absence of extravasation (Figure 3e, f, Figure 4). The patient was nearly asymptomatic immediately after the operation.

## Method

From January 2005 to December 2008, balloon kyphoplasty using the instruments of Medtronic Company was performed in 148 patients with 205 osteoporotic and tumor-related vertebral body factures. The procedure yielded good results. After the commercial introduction and certification of radiofrequency kyphoplasty in Europe in February 2009, this procedure has been used at our clinic in 21 patients and in a total of 26 vertebral body fractures. The core element of the StabiliT Vertebral Augmentation System marketed (DFine Inc.) is a novel PMMA cement (StabiliT® ER² bone cement), which is passed through an activation element (where it is heated by application of radiofrequency energy) and is converted from a liquid into a rubber-like, tough and high-viscosity phase immediately before application.

## Conclusion

The novel procedure of radiofrequency kyphoplasty offers a solution to several problems. These include the avoidance of access-, cement- and application-related complications as well as targeted reduction and controlled augmentation without the need for hectic activity due to extended working time using StabiliT® ER² bone cement and reduced radiation exposure for medical staff.

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### *Conflict of interests*

*The corresponding author has occasionally served as lecturer and adviser for DFine Inc.*

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