

Intraoperative radiotherapy during kyphoplasty for vertebral metastases (Kypho-IORT): first clinical results

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ABSTRACT

Aims and background. Kyphoplasty is an effective procedure providing structural stability and pain alleviation in vertebral metastases. To prevent early regrowth, patients typically receive postoperative fractionated radiotherapy, which is associated with long treatment duration. Therefore, we established a new approach to deliver intraoperative radiotherapy during kyphoplasty to shorten the treatment time and reach structural stability and sterilization of the metastases (Kypho-IORT).

Methods and study design. For Kypho-IORT, a 50 kV X-ray source with a specially designed applicator was used. A radiation dose of 8 Gy in 5 mm distance was delivered. After radiation the device was removed and the kyphoplasty was completed according to the standard procedure. Since August 2009, 18 patients with instable or painful spinal metastases received Kypho-IORT. The median age was 63 years (range, 43-73).

Results. Kypho-IORT was successfully performed in 18 of 21 vertebral lesions (86%). No severe complications occurred during or early after IORT. The median pain score using a visual analogue scale decreased from 5/10 before the procedure to 2.5/10 at day 1 ($P < 0.001$) and to 0/10 six weeks after the procedure ($P = 0.001$). Imaging studies were available for 15 of 18 patients. Stable disease within the irradiated vertebral body was seen in 14 patients (93%) and local progressive disease in one patient (7%). No re-irradiation due to local progressive disease or pain recurrence was necessary within the median follow-up of 4.5 months.

Conclusions. Kypho-IORT is well tolerated without severe side effects and provides fast improvement of pain. Although stable disease was seen in 93% of the patients, a longer follow-up is necessary to assess the effectiveness. A dose escalation study to establish the maximally tolerated dose has been initiated.

Key words: intraoperative radiotherapy, kyphoplasty, vertebral metastases.

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