

## Image-guided-radiotherapy retreatment of spine metastasis: a case report and radiobiological evaluation

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### ABSTRACT

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**Aims and background.** The present case report describes vertebral metastasis retreatment using kilovoltage cone-beam computed tomography (CBCT) for setup error correction, in order to improve target irradiation and prevent spinal cord toxicity. We evaluated the feasibility of the second radiation therapy course on the overlapping treatment volume.

**Methods and study design.** A patient with metastatic kidney cancer, previously treated to the tenth dorsal vertebra with conventional radiation planning (21 Gy; 3 × 7 Gy), underwent retreatment. In order to deliver 30 Gy (15 × 2 Gy) to the target volume with the second irradiation, we evaluated the residual dose that could be received by the spinal cord. We calculated the biologically effective dose according to the linear-quadratic model, using an  $\alpha/\beta$  ratio of 2 Gy. A 3-dimensional conformal plan was generated; CBCT imaging was used to ensure accurate repositioning.

**Results.** A total of 15 CBCT scans were performed; the mean setup corrections in the lateral, longitudinal and vertical directions were 3.38 mm (SD 2.09; range, -0.2 mm ÷ 7.6 mm), 2.13 mm (SD 3.38; range, -5.9 mm ÷ 6 mm), and -1.28 mm (SD 2.02; range, -7.1 mm ÷ 0.3 mm), respectively.

**Conclusion.** Image-guided radiotherapy is an alternative approach for the retreatment of spine tumors; it ensures accurate patient setup correction and high-precision treatment delivery, which are required for target volumes very close to critical structures. Free full text available at [www.tumorionline.it](http://www.tumorionline.it)

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**Key words:** image-guided radiotherapy, biologically effective dose, spinal cord toxicity, spine metastasis retreatment.

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