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Irradiation of pacemakers and cardio-defibrillators in patients submitted to radiotherapy: a clinical experience

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ABSTRACT

Aims and background. A prospective analysis was carried out on a group of irradiated patients with pacemakers or implantable cardioverter-defibrillators to identify any relationship between the various types of devices and physical and dosimetric parameters. Cardiac toxicity of the treatment was also investigated.

Methods and study design. Forty-five irradiated patients, implanted with pacemakers or implantable cardioverter-defibrillators, were prospectively investigated from 1999 to 2007. An analysis of radiation damage to pacemakers, depending on the geometric and dosimetric characteristics of the radiation beams, was carried out. The electric and magnetic fields of linear accelerators (LINACs) were measured to evaluate any interference. The calculation of dose received by pacemakers was evaluated by dose-volume histograms.

Results. No dysfunction was observed in any pacemaker, nor were the substitution times negatively affected. We did not find problems with the devices due to the interaction with the electromagnetic fields. Dose-volume histograms calculated for patients treated in regions close to devices (head & neck, thorax) showed an average maximum dose equal to 2.5 Gy for the head & neck area and equal to 1.8 Gy for the thoracic area. Acute (3 cases) and late (2 cases) cardiac events were observed only in 5 patients who underwent chemoradiation treatment, but no dysfunction was observed in any pacemaker.

Conclusions. Our study confirms the safety of radiotherapy for patients implanted with pacemakers or implantable cardioverter-defibrillators but suggests that chemoradiation represents a probable risk factor for cardiac toxicity. Furthermore, all cardiac events were observed in patients treated in the head and neck or left thoracic areas. A standardized protocol is advisable in order to improve patient control during the radiotherapy treatment. It is mandatory to calculate the dose received at the pacemaker/heart, even in the case of palliative treatment. **Free full text available at www.tumorionline.it**

Key words: cardiac toxicity, pacemaker, radiotherapy.

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