World Academy of Science, Engineering and Technology
International Journal of Bioengineering and Life Sciences
Vol:9, No:07, 2015

Cardiac Pacemaker in a Patient Undergoing Breast Radiotherapy-Multidisciplinary Approach

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Abstract : Objective: Cardiac pacemakers are very sensitive to radiotherapy treatment from two sources: electromagnetic influence from the medical linear accelerator producing ionizing radiation- influencing electronics within the pacemaker, and the absorption of dose to the device. On the other hand, patients with cardiac pacemakers at the place of a tumor are rather rare, and single clinic hardly has experience with the management of such patients. The widely accepted international guidelines for management of radiation oncology patients recommend that these patients should be closely monitored and examined before, during and after radiotherapy treatment by cardiologist, and their device and condition followed up. The number of patients having both cancer and pacemaker, is growing every year, as both cancer incidence, as well as cardiac diseases incidence, are inevitably growing figures. Materials and methods: Female patient, age 69, was diagnozed with valvular cardiomyopathy and got implanted a pacemaker in 2005 and prosthetic mitral valve in 1993 (cancer was diagnosed in 2012). She was stable cardiologically and came to radiation therapy department with the diagnosis of right breast cancer, with the tumor in upper lateral quadrant of the right breast. Since she had all lymph nodes positive (28 in total), she had to have irradiated the supraclavicular region, as well as the breast with the tumor bed. She previously received chemotherapy, approved by the cardiologist. The patient was estimated to be with the high risk as device was within the field of irradiation, and the patient had high dependence on her pacemaker. The radiation therapy plan was conducted as 3D conformal therapy. The delineated target was breast with supraclavicular region, where the pacemaker was actually placed, with the addition of a pacemaker as organ at risk, to estimate the dose to the device and its components as recommended, and the breast. The targets received both 50 Gy in 25 fractions (where 20% of a pacemaker received 50 Gy, and 60% of a device received 40 Gy). The electrode to the heart received between 1 Gy and 50 Gy. Verification of dose planned and delivered was performed. Results: Evaluation of the patient status according to the guidelines and especially evaluation of all associated risks to the patient during treatment was done. Patient was irradiated by prescribed dose and followed up for the whole year, with no symptoms of failure of the pacemaker device during, or after treatment in follow up period. The functionality of a device was estimated to be unchanged, according to the parameters (electrode impedance and battery energy). Conclusion: Patient was closely monitored according to published guidelines during irradiation and afterwards. Pacemaker irradiated with the full dose did not show any signs of failure despite recommendations data, but in correlation with other published data.

Keywords : cardiac pacemaker, breast cancer, radiotherapy treatment planning, complications of treatment
Conference Title : ICLSBE 2015 : International Conference on Life Science and Biological Engineering
Conference Location : Prague, Czechia
Conference Dates : July 09-10, 2015