



105 Breast and cervix cancer

Left breast radiation therapy - institutional analysis of doses to heart and LAD

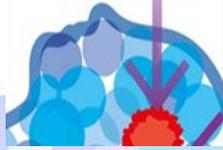
Borislava Petrovic^{1,2}, Laza Rutonjski^{1,2}, Milovan
Petrovic^{3,4}, Igor Djan^{1,3}, Branislav Djuran^{1,3}

1 Institute of oncology Vojvodina, Sremska Kamenica, Serbia

2 Faculty of Sciences, University of Novi Sad

3 Faculty of Medicine, University of Novi Sad

*4 Institute of cardiovascular diseases Vojvodina, Sremska Kamenica,
Serbia*



Introduction

- Breast cancer is global healthcare problem-yearly 1 500 000 new cases in the world, 1/3 ending up with death. Probability for female population is 1/8 (one of eight women will have breast cancer)
- Respiratory motions and free breathing during treatment of sites in the proximity of lungs, influence on treatment of tumor volumes
- Consecutively, respiration influences the dose received by normal tissues surrounding the tumor volumes.
- This is particularly important in patients undergoing radiation therapy of the left breast, since
 - these patients have long life expectancy and
 - the unintended irradiation of the heart and LAD artery, may cause later cardiac failure and other cardiac side effects.



Serbia

- Breast cancer
 - One of four cancer patients (26%), in female population, are breast cancer patients, and growing
 - App. half of them are left breast patients
 - In all deaths of malignant diseases, 17.5% are women who died of breast cancer
- Cardiovascular events
 - Ischemic heart disease (highest mortality rate- 1/100 in women will have myocardial infarction)
 - Pericardial disease
 - Cardiomyopathy
 - Valvular dysfunction and arrhythmia



Background

- Retrospective analysis of treatment plans of patients treated in our center in 2007-2010.
- These patients are currently under examination by cardiologists, their current status is evaluated, and if necessary they are treated cardiologically in order to prevent cardiac failure or other cardiac events.
- In parallel, current practice is changing for the left breast patients in radiation therapy- where possible deep inspiration breath hold with ABC (Active Breathing Coordinator, Elekta) is applied



Methods and materials

- The patients presented in this study were treated during 2009, in standard setup, (normal breathing, wing board). Treatments were delivered at Radiotherapy Clinic, Institute of oncology Vojvodina, Sremska Kamenica.
- The TPS used was Elekta, XIO v 4.62.



Methods and materials

- 114 left breast patients in 2009, of which 92 could be successfully de-archived 7 years after treatment, and returned to TPS.
- Since at the time of treatment planning for these patients, in 2009, the LAD artery was not delineated, the radiation oncologists delineated LAD structure on de-archived plans as they could recognize it, or where it should be anatomically (if not visible), and re-delineated heart, according to current practice and protocols at the Institute.
- Accordingly, the treatment plans were re-calculated and reviewed by medical physicists, to obtain doses to these two new structures



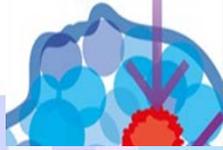
Results

- Evaluation of left breast patients treatment plans generated during the period January 1st 2009-December 31st 2009 are presented.
- The patients were prescribed 50 Gy to 66 Gy (breast, and somewhere additionally boost), depending on the stage and type of illness.



Results

- The maximum dose to the heart 62.4 Gy and minimum dose was 3.6 Gy, while mean dose to heart as whole organ was 3.9 Gy.
- The mean volume of the heart was 687 cm³.
- Left lung: the maximum dose found was 65.5 Gy and mean dose 6.9 Gy.
- Left anterior descending artery (LAD), which was newly delineated, after the de-archiving of the treatment plans, has received a dose range of:
 - maximum dose 62.1 Gy and
 - minimum dose 0.2 Gy, while mean dose was 20.3 Gy.
 - The volume of delineated LAD was 4.8 cm³.
- We did not yet record distances of the heart to the treatment field edge at this stage



Discussion/conclusions

- Breast cancer is
 - the most common cancer throughout the world female population.
 - nowadays illness which can be treated successfully, and life expectancy is long after treatment.
- If a patient is treated in such a way that she is free of cancer after treatment, and another life threatening illness is caused by the treatment of primary disease, then the result of cancer treatment is practically annulled.
- The dose to the neighbouring tissues depend mainly on anatomical structure of the patient, but there are now techniques which can improve the outcome to heart, LAD and lungs, as the most affected organs. This study will be continued, and these results are preliminary.



Discussion comparison to TRIAL

- Literature: Increase of 1 Gy of mean dose to heart increases probability for cardiovascular event by 7.4%
- Greater care is taken for left breast patients now
- LAD is contoured as standard for left breasts



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