How Radiotherapy for Cancerous Breast May Put the Opposite non-Cancerous Breast at Risk?

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Abstract---3-dimensional breast radiotherapy is the most prevalent techniques, carried out in all radiotherapy centers of the world including Iran. The objective of this study is to investigate the dose rate supplied to the opposite breast during the radiotherapy of breast cancer using the designing method of 3-dimensional therapy. 32 female patients suffering from breast cancer participated in this study. All of them were the candidate of breast radiotherapy. For each patient, a therapeutically designing was specified including. After the approval by physician (radiotherapy oncologist) the patient treatment was performed. Three TLD were used for measuring the intake dose of opposite breast for each patient. Then the doses obtained by TLD was examined. Results indicated that the average of absorptive dose calculated in the internal part of the opposite breast was by TLD (2/12) and had a significant increase (p<0.05) as compared to the above surroundings and nipple center. In addition, the dose of opposite breast in the patients treated with medial wedge in tangent field, increased significantly (p<0.05) compared to the patients without wedge in the tangent field. Conclusively, the use of medial wedge in tangent field causes an increase in the dose absorbed by opposite breast. As the radiation received by opposite non-cancerous breast can put the breast at risk, it is of importance to devise the techniques to reduce the dose of radiation received by opposite breast.

Keywords---Breast Cancer, Opposite Breast, Radiotherapy, Risk.

I. INTRODUCTION

Breast cancer is a malignant tumor occurring in the breast. The disease occurs almost entirely in women, but men can get it, too [1]. The first sign of breast cancer often is a breast lump or an abnormal mammogram. Breast cancer stages range from early, curable breast cancer to metastatic breast cancer, with a variety of breast cancer treatments. In recent years, there's been an explosion of life-saving treatment advances against breast cancer, bringing new hope. Instead of only one or two options, today there's an overwhelming menu of treatment choices that fight the complex mix of cells in each individual cancer. The decisions — surgery, then perhaps radiation, hormonal (anti-estrogen) therapy, and/or chemotherapy — can feel overwhelming. 3-dimensional breast radiotherapy is the most prevalent technique carried out in all radiotherapy centers of the world including Iran. One of the most important key points in 3-dimensional breast radiotherapy is to supply the maximum steady dose to the breast and the lymphatic drainage zone and minimizing the receiving/intake dose of the organs as well as the surrounding healthy tissues. The opposite breast due to the considerable closeness to the breast suffering from cancer, cancer stricken breast, definitely receives radiation during the breast radiotherapy [2]-[4]. The elevated incidence of breast cancer following irradiation of breast tissue has led to concern over the magnitude of the scattered radiation received by the uninvolved contralateral breast during radiation therapy for a primary breast lesion and the risk of an induced contralateral breast cancer [5]. The aim of this study was to investigate the dose rate supplied to the opposite breast during the radiotherapy of cancerous breast using 3-dimensional therapy.

II. MATERIAL AND METHODS

32 female patients suffering from breast cancer participated in this study. All of them were the candidate of breast radiotherapy and lymphatic region. Diagnosing simulating C.T scan was carried out for all patients after receiving their consent. The 3-dimensional therapy was performed using Eclipse software by physics service in addition to the designing physicists. For each patient, a therapeutic designing was specified including two medial and lateral tangent fields in addition to a field of anterior superclave. For most patients, the medial wedge was also used. After the approval by physician (radiotherapy oncologist) the patient treatment was performed with 5000 centigree in 25 therapeutic sessions. Three TLD were used for measuring the intake dose of opposite breast for each patient. One TLD on the nipple of opposite breast, other one 3 cm above than nipple and one TLD 3 cm inward to nipple. Then the absorption doses obtained by TLD were measured. The data were analyzed using student t-test.

III. RESULTS

Our findings indicated that the average absorptive dose calculated in the internal part of the opposite breast was by TLD (2/12) and had a significant increase (p<0.05) compared to the upper part of nipple and nipple center. In addition, the absorption dose of opposite breast in the patients treated by medial wedge in tangent field, increased significantly (p<0.05) compared to the patients without wedge in the tangent field.

IV. DISCUSSION

In our study, we reported that absorption dose of opposite breast in the patients treated by medial wedge in tangent field, increased significantly compared to the patients without wedge in the tangent field. It seems that in 3-dimensional breast radiotherapy, the dose received by the internal area of opposite...
breast is high. In addition, the use of medial wedge in tangent field causes an increase in the dose of opposite breast. There are other studies showing that single or dual wedge techniques resulted in the highest contralateral breast dose increases compared with open tangents [6]. Studies also show that the contralateral breast dose increase by a dynamic wedge is typically only about half of that reported for a conventional wedge for the same wedge angle and distance from the beam [5]. However, it has been shown that a 15 degree wedge inserted half way into the radiation field can be used effectively as a tissue compensator, in some cases reducing dose inhomogeneity by as much as 25% [7]. Perhaps, the scattering radiations resulted from wedge causes the intact breast to receive more radiation than what expected. As the intact breast receives considerable radiation during radiotherapy of cancerous breast, we suggest that the use of medial wedge should be avoided in radiotherapy of breast cancer. However, more research are also required to support this suggestion.

V. CONCLUSION

We have shown that the using of medial wedge in radiotherapy of breast cancer can result in increased absorption dose received by intact breast in opposite side, so, as prevention measure it is suggested to avoid medial wedge insertion during cancerous breast radiotherapy.

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REFERENCES