USING CT-BASED SIMULATION AS AN AID FOR RADIOTHERAPY OF BREAST CANCER

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Purpose *:* Using CT-based simulation as an aid for breast cancer radiotherapy to increase the accuracy of treatment and hope to decrease the rate of lung fibrosis.

Materials and Methods *:* From July 1994 to January 1999, we retrospectively analyzed 95 patients who received full course radiotherapy with regular follow-up at our department. The average age of the patients was 49 years old, and the median follow-up interval was 26.7 months. A method was devised to simulate patients with breast cancer in the actual treatment position by using a diagnostic CT spiral scanner and a workstation for virtual simulation. It was desired to produce non-divergent tangential beams through the lung at the matching line for tangential and supraclavicular fields. Each patient was immobilized in an Alpha Cradle cast. Radio-opaque markers were placed on the margins of the fields decided by simulation and CT scan was performed. The data set was transferred to the workstation. After reconstruction of all the images, we performed virtual simulation from computer. When treatment parameters were decided, we would resimulate patient before treatment started. Patients received regular follow-up after completion of radiotherapy. Chest X-ray films were taken to detect lung metastasis and fibrosis while physical examination and chest CT were performed to evaluate local recurrence.

Results *:* All the chest X-ray films were rechecked and 5 patients (5.26%) with lung fibrosis were noted. According to the chart records and CT images, local recurrence was noted in 3 patients (3.16%). Among the 5 patients with lung fibrosis, the average greatest perpendicular distance (GPD) measured from the CT image was 1.75 cm, the average irradiated lung volume of the tangential fields was 122.25 mlthat occupied 7% of the ipsilateral lung volume. For the 3 patients with local recurrence, the average GPD was 1.5 cm, the average irradiated lung volume within the tangential fields was 155.48 ml, and the average irradiated lung volume was 6.12% of the ipsilateral lung.

Conclusion *:* Using CT-based simulation as an aid for breast cancer radiation treatment was more accurate than traditional treatment planning. It provided us the accurate relationship between the position of the target and critical organs. We decrease irradiated lung volume and hope to reduce the chance of lung fibrosis.

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Key word : Radiotherapy, CT-based simulation, Breast cancer, Lung fibrosis.