

Purpose:

Radical radiation therapy that combines external beam therapy (EBRT) and brachytherapy (BRT) is effective in managing local-regional confined cervical cancer. Although CT is widely used for EBRT treatment planning (TP), traditional 2D film is still commonly used today in many institutions for BRT TP. The incompatible image information between the BRT and EBRT leads to great difficulty in computation of the cumulative radiation dose from both treatments. To date, doses to target and critical structures are approximated by adding the point doses of BRT to the EBRT plan. In this project, we propose to register the orthogonal films of BRT and CT of EBRT so as to accumulate the doses in a more accurate way.

Method and Materials:

Five patients treated with both EBRT and low dose rate BRT were retrospectively used in the study. 3D dose grids from the BRT and EBRT treatment planning were merged by a film-to-CT registration, which was accomplished by creating DRRs from EBRT-CT in the same projections of the BRT films. A landmark based image registration tool was developed to register films and DRRs of CT. The calculated shift, rotation and scaling were applied on the dose grid of BRT. Once the registration was completed, dose distributions from EBRT and BRT were merged.

Results:

A composite plan with accumulated doses of BRT and EBRT was created for each patient. The dose accuracy was verified at relevant points such as "A" points. The isodose curve and DVHs were analyzed, and appear reasonable.

Conclusion:

We developed a method to accumulate the dose distributions from film-based brachytherapy and CT-based external beam radiotherapy. This yielded a more realistic estimate of the cumulative dose received by the patient from both treatments.