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Tangential breast irradiation: A comparison between 2D and 3D radiation therapy plans

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Purpose: To evaluate the difference between a simple radiation therapy (RT) plan utilizing a single contour and a more complex plan utilizing multiple contours, lung inhomogeneity correction and a dose-based compensator.

Materials and Methods: This is a prospective study of the RT plans of 12 patients with early breast cancer. All patients were considered for breast conserving management and treated by conventional tangential fields technique. Three RT plans were generated for each patient. The first RT plan utilized two wedges and was based on the patient contour at one C-T slice taken at the central axis. No lung inhomogeneity correction was introduced for this plan. The second RT plan was produced by using the treatment parameters obtained from the first plan to demonstrate the radiation dose distribution in the entire treatment volume after introducing a lung inhomogeneity correction factor. The third RT plan was generated by using the 3-D planning system to design a dose based compensator after lung inhomogeneity correction had been made. The same normalization point was used for the three plans and the end point of the study was the comparison between the volumes receiving $\geq$105% of the prescribed dose ($V \geq 105\%$) in the second and third RT plans.

Result: Patients separation ranged between 17–28 cm (median 20 cm) and breast volumes ranged between 270–2174 cm^3 (median 713 cm^3). The adoption of the dose-based compensator plans over the conventional wedge plans resulted in reducing the $V \geq 105\%$ between 40–94% (median 61%). The maximum volume hot spot for the compensator and wedge plan didn't differ significantly and ranged between 110–116% and 108–119% respectively.

Conclusion: Dose-based compensator plans reduced substantially the $V > 105\%$. The clinical significance of this dosimetric improvement remains to be seen.

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Intratumoral fluorouracil (5-FU) injectable gel as a potentiator of standard radiotherapy in patients with locally recurrent or advanced breast cancer

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Purpose: Use of 5-FU as a radiopotentiator has involved continuous intravenous administration with its attendant side-effects and inconveniences. A new site-specific intratumoral delivery system has been designed to provide high tumor drug concentrations for extended periods. 5-FU is formulated in a viscous aqueous gel using purified bovine collagen as a biodegradable carrier matrix. We examined the effect of dose and schedule of 5-FU gel on safety in patients receiving standard radiation therapy for locally advanced or locally recurrent breast cancer.

Methods: The ongoing Phase I/II study includes patients with breast or chest wall involvement who have indications for definitive doses of radiation therapy to a previously unirradiated field. The open-label, dose-escalation safety study uses 0.2 mL of 5-FU gel/cm^3 of tumor (5-FU dose range, 5 to 30 mg/mL). 5-FU gel is injected once or thrice weekly during a standard course of radiation (200 cGy fractions daily × 5/wk for 5 wk) before a radiation boost phase. Patients are observed for treatment-related side-effects to determine maximum tolerated dose.

Results: No dose-limiting, treatment-related side-effects, soft tissue necrosis, or systemic toxicity has been observed to date in patients treated in the first 3 treatment groups. All patients have completed the prescribed treatment except one patient in whom radiation was discontinued when she developed widespread distant metastases. All patients developed partial or confluent moist desquamation (RTOG/EORTC grade 2), which was not dose-limiting. No patient refused further injections because of discomfort during the procedure. Preliminary results indicate that patients' antitumor responses to the combination treatment have been similar to those expected for radiation alone.

Conclusions: Combined use of 5-FU gel with radiation therapy has been shown to be feasible and well tolerated in the lower levels of a dose-escalation scheme in treatment of patients with locally advanced or locally recurrent breast cancer. With further dose escalation, intratumoral 5-FU gel may prove to be a practical and effective potentiator of radiation therapy in this and other patient groups.

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Radiation induced brachial plexopathy in early breast cancer

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Purpose: In loco-regional irradiation for breast cancer, the risk of radiation induced brachial plexopathy (RIBP) should be minimal. A retrospective survey was undertaken of 223 patients (T0–3, N0, NI, M0) treated with peripheral lymphatic irradiation for operable breast cancer to determine the incidence of RIBP.

Methods: A case note review of clinical evidence of RIBP among 223 patients breast cancer from 8/90-7/91 treated by PRI (anterior shoulder field with a posterior axillary boost: mid axillary dose was 45 Gy in 20 fr over 4 weeks [4–6 MV photons]. All fields were treated daily except the post axillary boost (alternate days). Median follow up was 67.8 mths.

Results: Two disease free patients met criteria of RIBP (0.9%). CT (Case 1) and MRI of the axilla (Case 2) were negative. In each case of RIBP the maximum axillary dose was less than the mean maximum axillary dose (5224.9 cGy) for the whole cohort.

Conclusions: The incidence of radiation induced brachial plexopathy with mid axillary fraction sizes of 2.25 Gy to a total dose of 45 Gy is low (<1%).

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Acute reactions and cosmetic outcome after conservative surgery and adjuvant RT in stage I–II breast cancer

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Purpose: To evaluate the influence of different modalities of postoperative RT on acute reactions and cosmetic results, we have analyzed 1689 pts with stage I–II breast cancer treated in 11 Institutions of Northern Italy (Lombardy) during 1997.

Methods: The analysis concerns 1069 pts. The mean age was 57 yrs. 31% were premenopausal, 76.7% had a ductal invasive carcinoma, 29% had positive nodes. The RT modalities were collected according to ICRU Report 50. The whole breast was irradiated with 60Co or 4–6 Mv photons at the mean ICRU dose of 50 Gy plus a booster dose of 10 Gy. The local toxicity was recorded using the EORTC-RTOG scale, while the cosmetic results, after surgery and during the F.U., according to a 4 grade scoring system (EORTC) and a patient's judgement.

Results: 90% of the RT treatments were ICRU level 2 and 10% level 1. The mean OTT was 42.86 days. The max acute cutaneous toxicity was registered between 40 and 50 Gy: grade 0 = 14.5%, grade 1 = 66.2%, grade 2–3 = 19.2%. The rate of postop cosmetic outcome was 24% grade 1–2, 2% grade 3, 7% grade 0 (excellent outcome). The patients, opinion was good in 58%, excellent in 25.4%, sufficient in 15.5%.

Conclusions: The definitive data will allow us to define the impact of surgery and RT, according to the different treatment methods, on toxicity and cosmetic outcome.

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Intraocular metastases from breast cancer: A retrospective Study of the Breast Cancer North Italian Radiation Therapy Oncology Group

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Purpose: To summarize a retrospective, multicentric experience in the management of intraocular metastases from breast cancer conducted in five Italian Radiation Therapy Centers.

Patients and Methods: We collected a consecutive series of 51 patients (53 eyes) affected by intraocular metastases from breast cancer, treated from 1977 to 1995. The lesions were located as follows: choroid in 37 cases, peribulbar soft tissues in 7 cases, retina in 9 cases. The treatment was performed by external radiation therapy with a 4–15 MV linear accelerator (45 cases) or with CO60 (8 cases). Radiation technique varied widely, because patients were treated in multiple institutions over a long period of time. Total doses delivered ranged between 14 Gy and 60 Gy (median 40 Gy), with conventional fractionation (1.8–2.2 Gy, 5 times/week) in 40 cases and with 2.5–3 Gy per fraction in 13 cases.