Treating Island Block Fields Using a Multileaf Collimator

The feasibility of using multileaf collimators to treat patients requiring island blocks was studied. The procedure involves first irradiating the entire open portion of the field, except for the small area that is inadvertently blocked by the leaves forming the island block. In the second exposure the previously treated area is blocked, keeping open only the area missed by the first irradiation. Ion chamber and film measurements were done in a polystyrene phantom at 8 cm depth, using a 14x14 cm^2 6 MeV photon beam having a 6x6 cm^2 island block at its center. The MLC dose was found quite similar to that of a comparable Cerrobend block. The area under the MLC island block received 5.8 % of the unblocked beam intensity, versus 5.4 % for the Cerrobend block. For the same number of monitor units, the open portion of the MLC field received 4.2 % more radiation than in the conventional treatment, in agreement with some leaf penetration and absence of the 3.3 % beam blockage by the tray. A line of 22 % maximum radiation loss, 2 mm wide at half maximum, was noted at the junction of the open field sections. It was attributed to the tongues of the collimator leaves and penumbra effects. Assuming random daily patient setup errors of ± 5 mm, the cold spot would be widened to 11 mm and reduced to 7 % intensity. Treatment with multiple fields would further decrease the severity of the cold spot, suggesting that MLCs may be acceptable for generating island blocks.