

AbstractID: 6496 Title: Clinical Field Matching Using Intraoperative ^{90}Y Brachytherapy Plaques

Purpose:

A ^{90}Y foil in a semi-cylindrical polycarbonate plaque has been developed and used to intraoperatively irradiate the dura for sarcomas of the spine in 16 patients. As smaller plaques are easier to place in restricted surgical fields, an investigation of field matching requirements was undertaken to evaluate the possibility of multiple site irradiations using small plaques.

Method and Materials:

Using a ^{90}Y brachytherapy treatment plaque and a cylindrical dosimetry phantom with the same radius, irradiations were performed using radiochromic film (GafChromic HS). 2 Gy was delivered, and the plaque was then moved to a position that would abut (0 mm) or overlap (1.5 mm, 3.0 mm, 4.5 mm, or 6.0 mm) with the previous plaque placement and an additional 2 Gy was delivered. Simulated field matching irradiations based on the plaque dose profile were also generated for 0 to 5 mm overlaps in 1 mm increments.

Results:

Measured peak % prescribed dose (%PD) and gap width below the 90% prescribed dose level (G90%) were determined to be -87% and 11.6 mm when abutting; -60% and 6.2 mm with 1.5 mm overlap; and -47% and 5.0 mm with 3.0 mm overlap. The dose profile was effectively flat with 4.5mm overlap and a peak overdosage of +34% was observed with 6.0 mm overlap. The simulated %PD and G90% were determined to be -84% and 9.5 mm when abutting; -77% and 8.2 mm with 1.0 mm overlap; -65% and 7.0 mm with 2.0 mm overlap; -45% and 5.0 mm with 3.0 mm overlap; and -17% and 2.5 mm with 4.0 mm overlap. A peak overdosage of +18% was observed with 5.0 mm overlap.

Conclusion:

A 5 mm plaque placement overlap provides for adequate field matching with the ^{90}Y plaque, improving its clinical utility and allowing for greater flexibility in the surgical environment.