Evaluation of Clinical Use of Siemens Variable Electron Applicator

The electron beam therapy is an important component of radiation therapy. The use of Siemens Variable Electron Applicator makes it possible to choose any electron field size between 4x4 cm^2 and 25x25 cm^2. Since this applicator can produce square and rectangular electron fields the use of the electron cutouts can be eliminated in many cases. The output factor, %DD and profiles were measured for square fields from 5x5 cm^2 to 25x25 cm^2 using a plane parallel ion chamber (PTW 0.3 cc) for 6, 9, 12, 15 and 18 MeV. The output factor is fitted with a fourth order polynomial equation and the output factor for any other square field can be readily determined using this equation. The output factor for any elongated field is determined using Clarksons sector integration method with the polynomial as the radial function.

The measured output factors for the elongated fields show significant (as much as 2.9 % difference) exchange effect. However, the calculated output factors agree within 0.5 % with the measured output for the elongated fields when the upper jaws represent the long side and for all square fields. This observation could be used to our advantage by keeping long side on the upper jaws and rotating the collimator to match the field on the patient. The dosimetric characteristics such as %DD, d_{max} , R_P, penumbra etc. remains nearly the same as for the conventional electron applicator.