Purpose:To improve dose homogeneity in the body using the compensator and to reduce the dose in some critical organs using the shielding blocks.
Methods:The bilateral opposing beams of the fully opened collimator produced by a 6MV Clinac iX with Perspex beam spoiler of 1 cm thick were used to irradiate the Randophantom at 415 cm treatment distance. The measurements of the radiation doses at the surface and inside the phantom were performed using thermoluminescent dosimeters. The midpoint of the level at the umbilicus represents the point of the reference dose. The experiments are divided into two parts. The first involved irradiation without any bolus and shielding block and the second was with bolus and shielding block.
Results:The first study without bolus and shielding showed higher doses at the surface of the head, neck and chest than the dose at the reference point. The dose inside the phantom for the brain, larynx, cervical cord, heart and both lungs were more than 10% higher than the reference dose. In the second study, the bolus was added to the region of the neck and brain for improving uniformity of dose distribution and one half-value thickness of shielding block for both lungs. The dose variations are within ±10% obtained at the surface and inside the phantom.
Conclusions:The bilateral fields TBI with the patient in supine position can undergo irradiation. The surface and inside organ doses excluding the shielding organs achieved uniformity within ±10%. The dose at the larynx with bolus was higher than the reference dose because of the thickness of the bolus was not enough to compensate for the missing tissue. The appropriate bolus thickness should be placed carefully at the neck, and the size of the lung block should be patient-specific.