Purpose: To assess rotating shield brachytherapy (RSBT) delivered with the electronic brachytherapy (eBT) source comparing to intracavitary (IC) and intracavitary plus supplemental interstitial brachytherapy (IC+IS BT) delivered with conventional isotope radiation source.

Method and Materials: IC, IC+IS and RSBT plan was simulated for 5 patients with advanced cervical cancer (>40cc). One BT plan for each patient (fraction 1) guided by magnetic resonance imaging (MRI) was used in our treatment planning system (TPS). A bio- and MRI-compatible polycarbonate (Makrolon Rx3158) intrauterine applicator was simulated for IC and RSBT, and the vienna applicator was simulated for IC+IS BT. 192Ir was used as the radiation source of IC and IC+IS BT; Xoft AxxentTM eBT source was used for RSBT. A 0.5 mm thick tungsten shield was used for RS-BT with different azimuthal and zenith angles. The total dose for each plan was escalated as the external beam radiation therapy (EBRT) plus BT times fraction number (5 in our case).

Results: RSBT and IC+IS BT had higher dose conformity in terms of D90 than IC BT for all the patients. The advantage of RSBT over IC+IS BT was dependent on the shield emission angle, tumor shape and tandem applicator location. The delivery time of RSBT was increased as finer emission angle was selected.

Conclusions: RSBT is a less-invasive potential alternative to conventional IC and IC+IS BT for treating bulky (>40cc) cervical cancer. RSBT can provide better treatment outcome with clinically acceptable increased delivery time if proper emission angle is selected based on the tumor shape and tandem applicator location.
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