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abstract

Uterine Motion Assessed by Daily Cone Beam CT-Scan During Radiation Treatment for Cervical Cancer

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Uterine Motion Assessed by Daily Cone Beam CT-Scan During Radiation Treatment for Cervical Cancer

Author: Maham Khan[1], Laraib Khab[1], Sehrish Abrar[2], Mariam Hina[1,], Tooba Ali[1] , Fabiha Shakeel[1], Sarah Akhter[1], Bilal Mazhar Qureshi[1,], Ahmed Nadeem Abbasi[1], Maria Tariq[1], Asim Hafiz[1,],Anam Khan[1], Nasir Ali[1]

Affiliation: [1] Aga Khan University Hospital, Karachi, Pakistan
[1] Sindh Institute of Urology and Transplantation, Karachi, Pakistan

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Introduction: Cervical cancer treatment with external beam radiotherapy (EBRT) is challenged by uterine motion, which can compromise clinical target volume (CTV) coverage. Daily cone-beam computed tomography (CBCT) offers a means to quantify and adapt for inter-fraction displacement.

Methodology: This prospective obser-vational study enrolled six cervical cancer patients undergoing definitive EBRT with concurrent cisplatin, followed by brachytherapy tandem and ovoid. Daily pre-treatment CBCT scans were registered to planning CT images, and maximal uterine displacements were recorded in anterior–posterior (AP), superior–inferior (SI), and right–left (RL) directions. Bladder volumes were measured, and Pearson correlations with motion were calculated.

Results: 150 CBCT scans were evaluated. Mean uterine displacement was greatest in the AP direction (0.96 ± 0.22 cm), followed by SI (0.92 ± he largest recorded shifts were 1.27 cm AP), 1.30 cm (SI) and 1.19 cm (RL). Mean bladder volume during treatment was 330.75 ± 52.95 cm^3. AP motion showed a moderate, non-significant correlation with bladder volume ($r = 0.357$, $p \approx 0.08$).

Conclusion: Uterine motion during EBRT for cervical cancer is direction-dependent and influenced by urinary bladder volume, particularly in the AP axis. Daily CBCT enables accurate quantification of motion, supports anisotropic margin design, and facilitates adaptive radiotherapy strategies to ensure optimal CTV coverage while sparing organs at risk.

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