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Prehabilitation to Improve Positioning Reproducibility in Patients Undergoing Pelvic Radiation Therapy

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Purpose / Objective

Reproducible patient positioning is essential for precision in radiation therapy (RT) delivery. However, a retrospective review of pre-treatment imaging demonstrated variability in daily patient set-up.

We tested the hypothesis that a structured daily pre-treatment stretching regimen is both feasible and effective for minimizing variability in positioning, as measured by sacral slope angles (SSA).

Methods & Materials

Eight female patients undergoing pelvic radiotherapy performed a structured daily hip exercise regimen (extension and external rotation) immediately prior to simulation and daily treatment. The control group of 20 patients (17 female and 3 male) had usual care. SSA measurements on daily pre-treatment imaging were compared to SSA measurements from the simulation CT for 5 weeks.

The extent of SSA variability between two groups and over time was analyzed using a linear mixed model. The same two readers independently measured SSA, comparing SSA on the day of simulation to SSA measured on each day of RT. Subjects enrolled in the study completed between 23 and 29 radiation treatment fractions (mean = 25.88, median = 25).

Summary / Conclusion

We demonstrated a significant decrease in the variability of SSA by implementing a simple pre-treatment stretching program, whereas control subjects exhibited an increasing variability of SSA over the course of treatment. We conclude that there is a potential benefit for prehabilitation during pelvic RT.

A challenge provided by this research was accurate measurement of SSA variation. There is subjectivity in human reader measurement. Incorporating anterior-posterior (AP) film coordinates may capture set-up variability and improve measurement reliability. We draw this suggestion from a breast cancer set-up variability study that evaluated translational error in three dimensions; left-right, AP, and cranial-caudal planes.

Future studies would benefit from randomized clinical trial design with larger sample sizes and longer follow-up duration. Reduction of toxicity may not be evident without a reduction in margins around the target based on the improved reproducibility of patient positioning.

References / Acknowledgements

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