Balloon mis-positioning during prostate cancer treatment could affect success of radiation delivery

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A University of Colorado Cancer Center study recently published in the journal *Physics in Medicine and Biology* shows that endorectal balloons commonly used during precise radiation treatment for prostate cancer can deform the prostate in a way that could make radiation miss its mark.

"Use of a balloon allows you to stabilize the anatomy. But what we show is that imprecision with balloon placement could reduce radiation dose coverage over the intended area," says Moyed Miften, PhD, FAAPM, investigator at the CU Cancer Center and chief physicist at the University of Colorado School of Medicine Department of Radiation Oncology.

Specifically, Miften and colleagues including Bernard Jones, Gregory Gan, and Brian Kavanagh studied the technique known as stereotactic body radiation, in which powerful, precisely-targeted radiation is delivered only to cancerous areas of the prostate with the hope of killing tumor tissue. An endorectal balloon is needed to hold the prostate in place while this high dose is delivered. The study used 71 images of 9 patients to show an average endorectal balloon placement error of 0.5 cm in the inferior direction. And these placement errors led to less precise radiation targeting and to uneven radiation dose coverage over cancerous areas.

"In radiation oncology, we use a CT scan to image a patient's prostate and then plan necessary treatment. But if during treatment the prostate doesn't match this planning image, we can deliver an imprecise dose," Miften says.

With the use of endorectal balloon, Miften and colleagues found prostates could be slightly pushed or squeezed, resulting in the prostate deforming slightly from its original shape and also sometimes tilting slightly from its original position in the body. These deformations can push parts of the prostate outside the area reached by the planned radiation.

"What we see is that whether or not a clinician chooses to use an endorectal balloon along with stereotactic body radiation for prostate cancer, it's essential to perform the procedure with image guidance. The key is acquiring images immediately prior to treatment that ensure the anatomy matches the planning CT," Miften says.

More information: iopscience.iop.org/0031-9155/58/22/7995/

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