AbstractID: 7224 Title: A method to determine the gantry isocentricity with a portal imager

INTRODUCTION:

Historical method of verifying the linear accelerator gantry isocenter depended on the use of “star shots” with film. This method is subjective and its accuracy is in doubt when the expected results are in the range of 1.0 mm or less. In addition, collimator jaw symmetry and movements affect the measurement accuracy of the gantry isocentricity.

Modern linear accelerators are capable of isocentricity less than 1.0 mm radius and modern radiation therapy departments are film-less.

The purpose of this investigation is to establish a different method to verify the isocenter accuracy during the initial acceptance testing and routine physics QA. Because modern linear accelerators are equipped with electronic portal imagers, this investigation uses the portal imager to determine the gantry isocenter accuracy.

METHODS AND MATERIALS:

Out-line of the procedure:

(1) Check the cross-hair mechanical rotational isocentricity.
(2) Setup a metallic object at the isocenter using the light-field and the collimator cross-hair.
(3) Take a static portal image of this metallic object with gantry pointing vertically down.
(4) Without moving the portal imager, take a portal image of this object while the gantry makes a 360-degree arc rotation with the same monitor unit as the static exposure.
(5) Analyze the full-width-half maximum (FWHM) of each or subtracting these two images.

RESULTS AND DISCUSSIONS:

If the gantry isocentricity is perfect, the two images would be identical and the FWHM will be identical. But, if the gantry isocentricity is a 2.0 mm diameter, the FWHM will reflect that as well.

Advantages of this method are:

(1) Less subjective and less dependent on observers.
(2) Able to detect isocentricity less than 1.0 mm diameter.
(3) Results are immediately available for analysis.
(4) No films.
(5) Results are electronic and can be analyzed by using readily available tools and methods.