**INTRODUCTION AND OBJECTIVES**

MRI-only radiotherapy workflow are now being clinically used. Intraprostatic gold fiducial markers (GFM) are hard to separate from calcifications and bleedings in MRI-images. Achieving accurate GFM identification in MRI-images alone thereby constitute a major challenge. No method with 100% identification accuracy has, to the best of our knowledge, been presented. We suggest that C-arm X-ray images (CkV-images), acquired at GFM implantation, could provide GFM-position information and be used to confirm correct identification. This would require negligible GFM migration between GFM implantation and preparative radiotherapy imaging. 

The aim of this study was to: 1) study the GFM migration 2) investigate feasibility of using CkV-images to confirm accurate GFM identification.

**METHODS**

**Study design**

Frontal digitally reconstructed radiographs (DRR)-images, originating from synthetic CT-images with burned in synthetic fiducials, and CkV-images were created or acquired two weeks apart for 16 patients in an MRI-only radiotherapy workflow. To assess marker migration, DRR- and CkV-images from 31 patients in a conventional CT-based radiotherapy workflow were created or acquired two weeks apart.

**Image processing and analysis**

A common image geometry was defined between the DRR- and CkV-image for each patient. For each image, a point cloud was defined from the GFM center of mass coordinates. A rigid registration between the point clouds was performed and the distance between each of the GFM in the DRR- and registered CkV-image was calculated. Visual GFM match inspection was performed after point-cloud registration.

**Migration assessment**

The distance calculated in the CT-based patient cohort was considered a measure of GFM migration. A statistical test was performed to assess any mean distance difference between the MRI-only- and CT cohort.

**CONCLUSION**

A C-Arm X-ray image acquired from the GFM implantation procedure could be used to confirm accurate GFM identification in an MRI-only radiotherapy workflow. GFM migration was present but did not constitute a problem.

**RESULTS**

The mean GFM-migration assessed in the CT-based patient cohort was 1.2±0.7 mm. The mean absolute distance difference for the GFM center of mass for the patients in the MRI-only workflow was 1.7±1.4 mm. No significant difference between the measured total distances of the two cohorts could be detected (p-value = 0.37). The deviation of 1.7 mm was therefore considered as a small and acceptable distance in the proposed method. Visual GFM inspection could confirm correct identification of all GFM, see figure, part C and G.

**DISCUSSION**

GFM migration effects (1.2 mm) could explain a major part of the total distance difference measured in the MRI-only cohort (1.7 mm). Marker migration was in accordance with previous literature. The scaling of the CkV-image and possible differences in patient positioning all contributed to additional uncertainties in the method. These contributions were however considered to be minor. The proposed method can detect if errors in the GFM identification process has occurred.

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