AbstractID: 5275 Title: Two-Dimesional analysis of patient cervical spine movement pattern during radiation therapy

Purpose: To characterize the two dimensional movement pattern of cervical spine during head and neck radiation treatment with the aim to adaptively modify the treatment.
Method and Materials: An intensity based algorithm was used to extract the vertebrae contours in both diagnosis CT and treatment planning CT images. Vertebrae movement variables were characterized by superimposing segmented sagital CT images using a localized linear conformal registration. The correlation coefficient was used as a method of measuring the similarity for registration. Relative 2-D motion of cervical spine were characterized by a transformation matrix representing motion relative to the adjacent vertebrae with 3 degrees of freedom by rigid body Euler angle and translations of orthogonal coordinate system.
Results: We demonstrated that an intensity-based local linear conformal registration can be used accurately co-registered cervical spine in the treatment planning CT images acquired before the treatment and in the diagnosis CT images. A large variation was observed in the transformation matrix. The mean absolute Euler rotation of vertebrae were 25.4º for C2, 18.9º for C3, 13.7º for C4, 11.3º for C5, 5.3º for C6 and 7.6º for C7.
Conclusion: We have quantitatively analyzed the intervertebral motions of the cervical spine during the radiation treatment. We have documented the first accurate depictions of cervical spine coupled motion. This information can be used for treatment planning in an adaptive CT-guided radiation therapy.
Conflict of Interest (only if applicable): NA.