

AbstractID: 3901 Title: Pitch, roll and yaw device for helical Tomotherapy head & neck and brain treatment

Purpose: To demonstrate the effectiveness of a new pitch, roll and yaw device for helical Tomotherapy head and neck and brain treatment.

Methods & Materials: The pitch, roll and yaw device is a headrest frame with a mechanism for adjusting angular orientation. It is fabricated using two overlaying Lucite panels mounted on an adjustable wheel base. With the use of the pitch, roll and yaw headrest device three MVCT image sets are obtained, and two displacement adjustments (first angular, second translational) are made. Since the axis of rotation may not be located in the center of the image volume, adjustments for the rotational and translational displacements have to be made independently. The rotational adjustments are made after the first scan, and the translational adjustment is made after the second scan. A third MVCT scan is obtained for final verification prior to treatment.

Results: Using the headrest device, on average the pitch, roll and yaw angular displacements can be reduced to less than 0.2° , 0.3° , and 0.25° , respectively, after three MVCT scans. The final translational x, y, z, displacements are still be minimized to less than 1mm after rotational adjustments.

Conclusion: As a mechanism for adjusting angular displacements, the pitch, roll and yaw device provides additional degrees of freedom for target localization. However, one additional MVCT image set is needed in order to independently adjust the rotational and translational displacements.