

COMPARISON OF REPOSITIONING ACCURACY AND COMFORT SURVEY IN TWO HEAD SUPPORTS USED INSIDE THE SAME AVAILABLE IMMOBILIZATION SYSTEMS FOR TREATMENT OF HEAD-AND-NECK TARGET

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Objectives/Hypothesis : To compare setup reproducibility, comfort level and hardness perceived by the patients between two head supports employed in the same immobilization system in head-and neck radiotherapy. Additionally, the relationship between setup accuracy and patient comfort survey was also investigated.

Methods : Between March 2011 and February 2012, there were 35 patients undergoing head-and-neck radiotherapy (RT) being recruited and all studied patients received the same immobilization device (a standard thermoplastic head-and-shoulder mask, Type S mask) twice, in which two different head supports were employed. Both a TIMO support and a Silverman support were used to compare setup accuracy/precision with several types of measurement respectively in each studied patient. All patients underwent planning computed tomography (CT). A series of on-board images (OBIs) were taken at the start, during, and by the end of the radiotherapy course in each studied patient. The OBI images were subsequently co-registered and repositioning accuracy was examined by recording displacement including three axes at the isocenter and orthogonal planes. Furthermore, the patients' subjective perception of comfort level, hardness, and preference for selecting between the two head supports were analyzed and compared. Last but not least, we attempted to explore the association between repositioning accuracy represented by several indicators and the patients' subjective perception in terms of comfort level and hardness.

Results : A total of 351 OBI data sets were analyzed. Although the absolute difference was quite small between the two head supports (TIMO support vs. Silverman support) with regard to three displacement errors, total vector displacement errors, spine curve, and mandible angle, it was noted that Silverman support was associated with more limited repositioning displacement in the antero-posterior (AP) and medio-lateral (ML) directions (paired t-test, $p= 0.011, 0.004$, respectively). As the RT course was proceeding, a trend was noted toward a greater variation in both spinal curve and mandible angle, suggesting that reproducibility should be paid more attention when the RT course moves forward. In the comfort survey, perception of hardness was positively correlated with comfort level in both head supports with weak but significant significance (Spearman's correlation coefficient =0.387, $p < 0.001$). As for the association between repositioning accuracy and comfort survey, although there was no any correlation between hardness of head supports and repositioning accuracy, comfort

level was positively correlated with repositioning displacement in rotation (Pearson's correlation coefficient =0.213, $p < 0.001$) and total vector displacement error (Pearson's correlation coefficient =0.153, $p = 0.006$) in Silverman head support only.

Conclusions : The results of the current study have demonstrated that the available immobilization system equipped with either TIMO head support or a Silverman head support provides satisfactory and nearly equivalent repositioning-related outcomes. More limited repositioning displacement is positively associated with more satisfactory perception of comfort level exclusively in the immobilization system equipped with Silverman head support. In the future, we might consider leaving the choice between the two different head supports to the individual patient according to subjective perception of comfort level.

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