Accurate and stable immobilization with Lorca Marin masks for head and neck IMRT verified by IGRT.

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Objective: IMRT needs accurate and repeatedly image controls to verify online the patient position and check that the tumor is properly included. The aim of this work is to analyze the setup accuracy and stability resulting from the use of the Lorca Marin thermoplastic masks during the complete course in head and neck cancer treatment with intensity modulated techniques.

Patients and Methods: 50 consecutive head and neck cancer treatments with IMRT were analyzed. Lorca Marin customized masks named Nature were used to immobilize head and neck. These 2-oxepanone polymer thermoplastic masks are 3-points immobilization with frontal and mental reinforcement and 3.2 mm thickness. 3-standard references were marked on the surface of the mask and on the middle chest of the patient for accurate positioning every day. Cone-beam computed tomography scan to verify online the position was performed during 5 consecutive days and after, weekly cone-beam (CBCT) until the end of the treatment. After weekly matching process using automated soft-tissue registration, translational movements along the three axes (x, y, z) were collected and the average for each treatment and each axis was calculated. Displacement’s mean of the 50 averages and the standard deviations were analyzed and compared.

Results: The resulting displacement average after analyzing 50 treatments was less than 1 mm along the three axes: x = (0.62±0.51) mm, y = (0.83±0.63) mm, z = (0.65±0.59) mm. These setup displacements have remained under 3 mm in 100% of treatments. These results achieve the International Commission on Radiation Units and Measurements recommendations regarding the setup margin to compensate the immobilization and positioning errors.

Conclusion: The type of patient immobilization devices and their contribution in the setup errors must be taken into account for IMRT. Additionally, the use of different image-guidance systems can significantly alter the size of the required margins. Lorca Marin thermoplastics masks with weekly CBCT show enough accuracy and stability for IMRT head and neck cancer patients.