Introduction. New treatment techniques based on intensity modulated (IMRT) improve the conformation of the dose distribution to the target volume, minimizing the absorbed dose in the organs at risk. Due to the complexity of these techniques a pretreatment patient-specific quality control is necessary.

Methods. To implement a quality control procedure to ensure the agreement between the planned and the delivered treatment.

Materials and methods. In our company there are available 2 Varian CLINAC 21EX accelerators and 1 Xio (Elekta) treatment planning system (TPS) To verify the absorbed dose, the treatment plan is calculated based on computed tomography (CT) images of the phantom. After irradiating the treatment plan on the phantom, the measured dose at the isocenter is compared with the calculated dose from TPS using a 3D ionization camera PinPoint 0016 cc. A portal imaging device, EPID, (Portal Vision AS1000) is used to check the dose distribution. The treatment plan is calculated on the CT of the EPID and an integrated image of each beam is obtained. The correspondence between the pixel values and the dose is known by prior calibration of the EPID. Comparison between the measured dose distribution and the dose calculated from TPS is made with the software OmniPro I'mRT (IbaDosimetry).

Results. The discrepancy between the dose measured by ionization chamber and the calculated dose should be less than ±3% for the acceptance of the treatment. The dosimetric distributions were evaluated using gamma analysis. Treatments are only accepted with gamma test results (3%, 3 mm) <1 higher than 95%.

Conclusions. The procedure used for treatment verification has proved to be accurate, fast and simple. Moreover, EPID-based dosimetry allows immediate analysis of the results and presents the additional advantage of allowing separate evaluation of each beam’s dose distribution.

http://dx.doi.org/10.1016/j.rpor.2013.03.630

Verification of positioning using a new immobilisation system for craniospinal paediatric treatment

B. Meira Montenegro 1, A. Alfaya Virzi 1, A. Lamas Lorenzo 1, L. Pereira Ferradas 1, M. Mera Iglesias 1, D. Aramburu Nuñez 1, M. Salgado Fernandez 1, M. Hernandez Herrera 1, V. Muñoz Garzon 1
1 Hospital do Meixoeiro, Radiosofia, Spain
2 Hospital do Meixoeiro, Radioterapia, Spain

Introduction. Craniospinal irradiation for children with neural cancer diseases or carcinomas is a very important technique in paediatric radiotherapy. Treatment in prone position is more appropriate, although requires special immobilisation system adapted for children. The aim of our study is to present a clinical experience of one paediatric treatment using this new immobilisation system and verification of treatment positioning.

Methods. A 3 y.o. patient diagnosed with choroid plexus carcinoma of the left occipital, GRADE III, with complete exerisis, chemotherapy (CPT protocol SIOP 2009). Radiotherapy treatment: prescribed dose, 30.6 Gy, (1.8 Gy/f) with a boost to the PTV up to 54 Gy. Treatment was delivered in a Primus Linac with a spinal posterior beam and two lateral cranial beams, changing every 10 Gy the junction point of the beams to reduce overdoses, opening the spinal field 1 cm and closing cranial to adapt and matching them. A newly designed pediatric immobilizer adaptable for ages 2–15 years (by SIHO) was used to immobilize the patient. Gafchromics® films were used to verify the doses in the overlapping areas, using solid water. Treatment positioning was verify by Exact Trac® (Brainlab).

Results. Differences between measured doses by Gafchromic films and calculated doses by TPS Xio® in junction points were lower than 4%, which decreases to 1.3% of 10 Gy to change the field junction area. With Exac Trac® system movements of the patient are measured in inter-fractions and intra-fraction. The movements of the centre of the tree-ball device are lesser than 1 mm for intrafraction measurements, and lesser than 5 mm for interfraction measurements.

Conclusions. The new immobilisation system allows a reproducible positioning of the patient during the treatment. The combined use of this immobilisation system with the ExacTract monitoring system reduces the intrafraction positioning inaccuracy to 1 mm, as other much more expensive systems.

http://dx.doi.org/10.1016/j.rpor.2013.03.631

Visible light in IGRT: AliningRT

S. Cantera Cabañas, L. Parreño Romeu, F. Perruca Salvador, V. Laguna Molina, R. Martinez San Juan,
N. Hidalgo Llopis, P. Calatayud Cuesta
HGUV-ERESA, Oncología Radioterápica, Spain

Introduction and objective. A new system based in structured visible light has been installed in our service that allows to reconstruct the three dimensional patient surface. We want to show how it works and what possibilities offers for patient treatment.

http://dx.doi.org/10.1016/j.rpor.2013.03.631
Material and methods. Consists in two imaging units connected to a workstation with two terminals. Each imaging unit has a structured light projector and two video cameras. For daily quality control is required to use a specific dummy. We have established a protocol of daily positioning for patients in thorax and breast locations: Positioning the patient with the planning CT tattoos. Taking 3D images of patient surface. Comparison with the outer contour of the planning CT. Deviations due to translation and rotation are corrected in real time inside the treatment room to achieve the allowed tolerances (2 mm and 2). New 3D image to register the final state. During the early stages, results are compared with the traditional method based on X-rays the first day of treatment. Quality assurance process requires monthly calibration and daily verification. If tolerances are exceeded, it is necessary to recalibrate.

Results. AlingRT achieves greater precision in positioning the patient daily because it compares daily surface structure with planning CT. It reduces global positioning time, increasing the reliability of our treatments. Using AlingRT, the radiation dose is reduced because you can reduce the radiographic films. The tolerance for daily verification is 0.3 mm. If verification exceeds 0.5 mm the system must be calibrated.

Conclusions. The use of AlingRT as positioning system allows us to improve positioning accuracy and reduce the time spent in the treatment unit, placing the patient in real time without radiation added.

http://dx.doi.org/10.1016/j.rpor.2013.03.632