

Quality assurance program for Radiosurgery at Clinicas Hospital: results of implementation

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Due to the complexity of the Radiosurgery and fractioned stereotactic radiotherapy processes, it is mandatory to establish a proper quality assurance program for each patient to be treated with this treatment modality [1]. In this work, such program will be described with their respective results covering the following aspects: QA of stereotactic target localization with all image modalities; basic dosimetry; treatment planning; absolute dose output calibration and delivery dose. These tests require a proper phantom (an IMRT phantom for example) as well as appropriate dosimetric equipments such as ion chambers and diodes with small sensitive volumes, solid water phantom, radiographic films in order to perform all periodic tests.

This investigation was performed in a linear accelerator Varian 6EX associated with a BrainLab micro-multileaf collimator system (m3) at Clinicas Hospital. Since the most important QA test in Radiosurgery is the periodic verification of the mechanical stability of the nominal isocenter, a checklist for the treatment procedure was elaborated for each individual patient and containing the following steps: null the millimetric scales of the stereotactic base; check the lasers alignment; make the isocenter verification (Winston-Lutz test); position the localizers foils in the localization box; couch adjustment at the isocenter; record the position parameters of the isocenter; record the couch parameters; check the MLC draws for each beam. Once those are performed, the patient is then positioned for treatment and the following steps terminate the whole process [2]: the patient is positioned in the stereotactic assembly; the localizer box is then attached to his/her head; the couch is moved up in order to realign the lasers at the isocenter; a fine adjustment is performed with the stereotactic base; the localizer box is removed; and finally, the treatment is initiated.

In order to evaluate the set-up errors, the difference among these parameters are given in Table 1. Fifteen patients submitted to either Radiosurgery or fractioned stereotactic Radiotherapy were considered in this preliminary study.

Table 1 – Mean variation between coordinates of isocenter localization and isocenter positioned as well as mean variation between couch coordinates regarding to isocenter and calculated couch coordinates.

	Mean value – 15 patients
ISO_DIF AP	-0,098 mm
ISO_DIF VERT	-0,077 mm
ISO_DIF LAT	-0,014 mm
COUCH_DIF AP	2,878 mm
COUCH_DIF VERT	-0,115 mm
COUCH_DIF LAT	0,819 mm

From these results, one verifies a larger variation of the isocenter localization for antero-posterior and vertical orientations. Regarding the couch coordinates, a major difference was found for the antero-posterior orientation. However, the results from the Winston-Lutz

test are within expected variations.

Preliminary results for the treatment planning evaluation, where the patient's plans were exported to an IMRT phantom (Scanditronix-Wellhöfer) and some measured values of absorbed dose were thus obtained by means of an ion chamber will be presented [3].

REFERENCES

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[3] Cosgrove V P, Jahn U, Pfaender M, Bauer S, Budach V and Wurm R E 1999 Commissioning of a micro multi-leaf collimator and planning system for stereotactic radiotherapy. *Radiother. Oncol.* **50**: 325-336.