

Clinical evaluation of the accuracy of an invasive frame designed for stereotactic intracranial radiosurgery treatment with helical tomotherapy

Michele Zeverino¹, Salvina Barra², and Gianni Taccini¹

¹Department of Medical Physics, and ²Department of Radiation Oncology, National Cancer Research Institute, Genoa, Italy

ABSTRACT

Aims and background. The study focused on the evaluation of the accuracy of intracranial stereotactic radiosurgery treatments delivered with helical tomotherapy by means of the InterFix™ Radiosurgery kit.

Methods and study design. Twenty-two patients received stereotactic radiosurgery treatments with single fraction dose ranging from 13 to 20 Gy depending on diagnosis. Megavoltage computed tomography scans performed prior the treatments were analyzed in order to determine the position accuracy. For 8 selected cases, they were also performed at the end of the treatment to evaluate the intra-fraction motion.

Results. Mean setup errors and standard deviations were -1.6 ± 2.2 mm, -0.2 ± 1.2 mm, 0.4 ± 1.3 mm, $0.2 \pm 0.5^\circ$ for the lateral (IEC-x), longitudinal (IEC-y), vertical (IEC-z) directions and rotational variation (roll), respectively. Setup error was found to be greater than 3 mm-PTV expansion in 36% of the cases. Mean intra-fraction motion was 0.5 ± 0.7 mm, -0.3 ± 0.4 mm, 0.1 ± 0.5 mm and $0.1 \pm 0.2^\circ$ for the IEC-x, IEC-y, IEC-z and roll, respectively.

Conclusions. Observed intra-fraction movements of less than 1 mm suggested the use of the tested fixation device for stereotactic radiosurgery treatment on helical tomotherapy providing that the image-guidance procedure is always performed prior to treatment.

Key words: helical tomotherapy, intra-motion evaluation, patient setup accuracy, stereotactic intracranial radiosurgery.

Conflict of interest statement: None.

Correspondence to: Michele Zeverino, Department of Medical Physics, National Cancer Research Institute, Largo R Benzi 10, 16132, Genoa, Italy.
Tel +39-010-5600398;
fax +39-010-5600032;
email michele.zeverino@gmail.com

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