

End to End Test with Intracranial Gamma Knife

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Objective(s): Simulate the entire treatment process of Masep's Infini gamma knife using simulation phantom and conduct comprehensive verification and evaluation for key dosimetry parameters that affect the effectiveness of treatment.

Methods: Simulate the patient's head structure with a simulation phantom, secure it with an Infini headframe, perform a CT scan and obtain scanning images with fiducial points, import scanned images to Infini treatment planning system (TPS). Design multiple test schemes in TPS to verify and evaluate three key dosimetry indexes that affect the effectiveness of treatment: integrated positioning accuracy, absolute dose error and percentage isodose curve. For measurements to verify integrated positioning accuracy, eBT3 film, scanners, and corresponding film analysis software are used for analysis. For absolute dose errors, measurements are made using a PTW ionizing chamber dose meter calibrated by the National Ionizing Radiation Institute. For percentage isodose curve, irradiated films according to the test schemes are scanned and imported into TPS to obtain the actual percentage dose curve and compare them with TPS calculated percentage isodose curve, thus to evaluate the coincidence of the two isodose curves.

Results: Integrated positioning accuracy is 0.5mm. Absolute dose error is less than 3%. Percentage isodose curves (80%, 50%, and 30%) have less than 1 mm error between measurements and calculations.

Conclusion(s): Through end to end test for three key dosimetry indexes that affect treatment efficacy, it is verified that Infini gamma knife performs well to meet clinical needs.