174: INTERNATIONAL SURVEY FOR INTRACRANIAL STEREOTACTIC RADIOSURGERY DOSIMETRY AUDITS – WHAT IS AVAILABLE WORLDWIDE AND HOW IT WORKS

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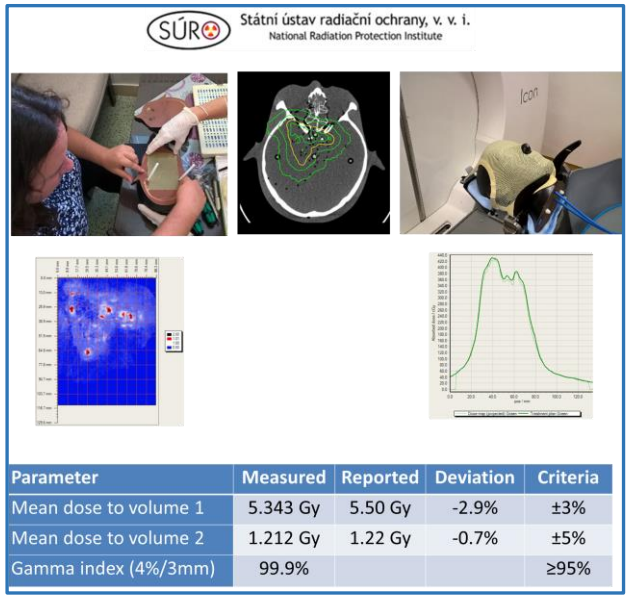
INTRODUCTION AND OBJECTIVES

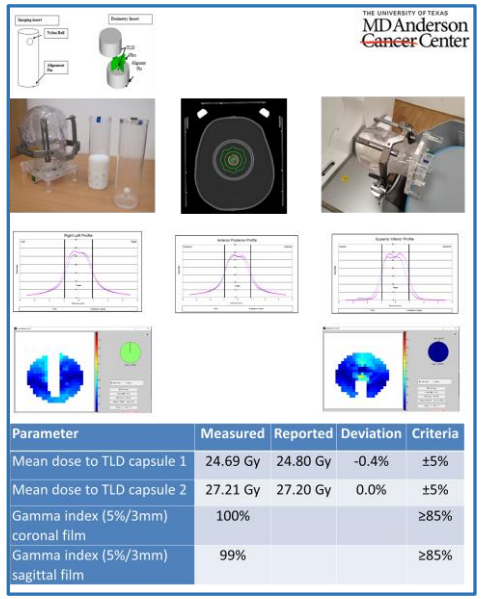
End-to-end test or dosimetry audit should be a mandatory part of a good clinical practice. It should be performed ideally after acceptance and commissioning before the first treatment and then repeated periodically. Unfortunately, clinical practice shows that typically less than 30% sites with stereotactic radiosurgery undergo official dosimetry audit carried by a standard laboratory. The purpose of this project is to perform survey of worldwide radiosurgery dosimetry audits.

METHODS AND MATERIALS

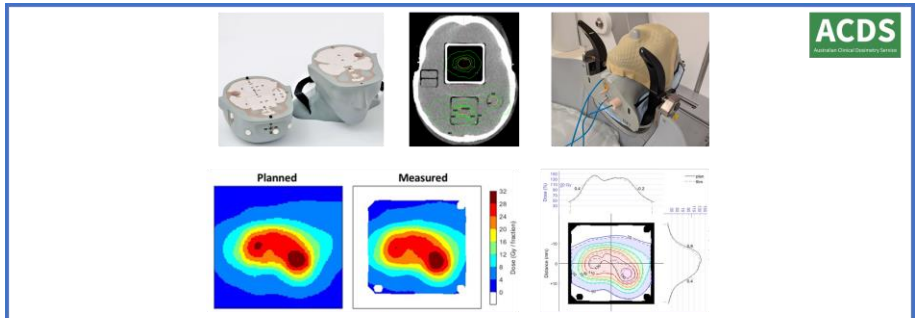
At the current stage of this project, we identified institutions which offer intracranial stereotactic radiosurgery dosimetry audit: 1) The MD Anderson Dosimetry Laboratory (MDADL), Houston, USA, 2) National Radiation Protection Institute (NRPI), Prague, Czech Republic, 3) RTsafe P.C., Athens, Greece, 4) National Physical Laboratory, Teddington, UK, 5) Australian Clinical Dosimetry Service (ACDS), Melbourne, Australia. Three audits were performed at this point: 1) NRPI audit provided measurement of mean dose in two points by Exradin W1 plastic scintillator detector and 2D dose distribution measured by Gafchromic EBT3 film in the Alderson Head adapted phantom, 2) MDADL audit provided point dose measurement by two TLDs and 2D dose distribution by two Gafchromic films, and 3) ACDS audit provided measurement of Gafchromic film and microdiamond measurements for three plans in an IMT MAX-HD phantom. The first two audits were performed on an identical Leksell Gamma Knife Icon unit in Prague, Czech Republic; the third audit was performed on a dosimetrically equivalent LGK Esprit in Brisbane, Australia.



Parameter	Measured	Reported	Deviation	Criteria
Mean dose to volume 1	5.343 Gy	5.50 Gy	-2.9%	±3%
Mean dose to volume 2	1.212 Gy	1.22 Gy	-0.7%	±5%
Gamma index (4%/3mm)	99.9%			≥95%



Parameter	Measured	Reported	Deviation	Criteria
Mean dose to TLD capsule 1	24.69 Gy	24.80 Gy	-0.4%	±5%
Mean dose to TLD capsule 2	27.21 Gy	27.20 Gy	0.0%	±5%
Gamma index (5%/3mm) coronal film	100%			≥85%
Gamma index (5%/3mm) sagittal film	99%			≥85%



Parameter	C.15 PTV1	C.16 PTV1	C.16 PTV2	C.16 PTV3	C.16 PTV4	C.17 PTV1	C.17 PTV2	C.17 PTV3	C.17 PTV4	C.17 PTV5	Criteria
Gamma Index (5%/1mm)	100%	98.6%	97.4%		98.2%	100%	100%	-	97.0%	100%	≥ 95%
Mean DTA L-R (mm)	0.1	0.0	0.0	0.2	0.3	0.0	0.0	-	0.1	0.1	≤ 1mm
Mean DTA A-P/S-I (mm)	0.4	0.4	0.1	0.1	0.4	0.6	0.3	-	0.6	0.2	≤ 1mm
Local Point Dose Var.	3.1%	-2.4%	-	-	-7.6%	-0.8%	-	2.0%	0.5%	-	± 8%

RESULTS

Deviation in mean point dose in two positions in the NRPI phantom was -2.9 % and -0.7 %, respectively. Gamma passing rate for absolute dose distribution measured by film was 99.9 % (4 %/3 mm). Deviation in mean dose measured by two TLD capsules in the MDADL phantom was 0.45 % and -0.04 %, respectively. And gamma passing rate for absolute dose distribution measured by two films was 100 % and 99% for (5 %/3 mm). For the ACDS phantom, gamma passing rate, DTA, and point dose measurements were all scored at optimal outcome.

CONCLUSION

End-to-end tests showed good agreement between planned and delivered dose for both absolute point dose and 2D dose distributions from all three audits. This is study in progress, and we expect subsequently to perform audits from all providers.

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