USING G-FRAME ANGLES IN GAMMA KNIFE RADIOSURGERY FOR INTRACANAL VESTIBULAR SCHWANNOMAS

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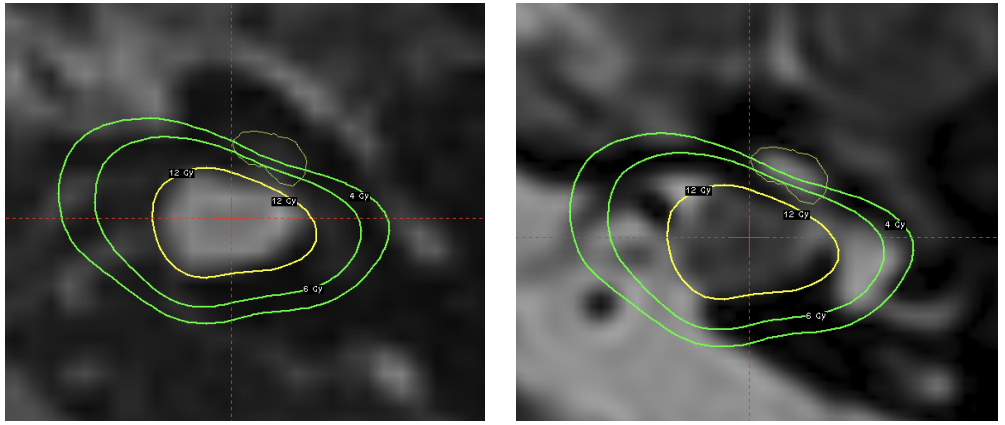
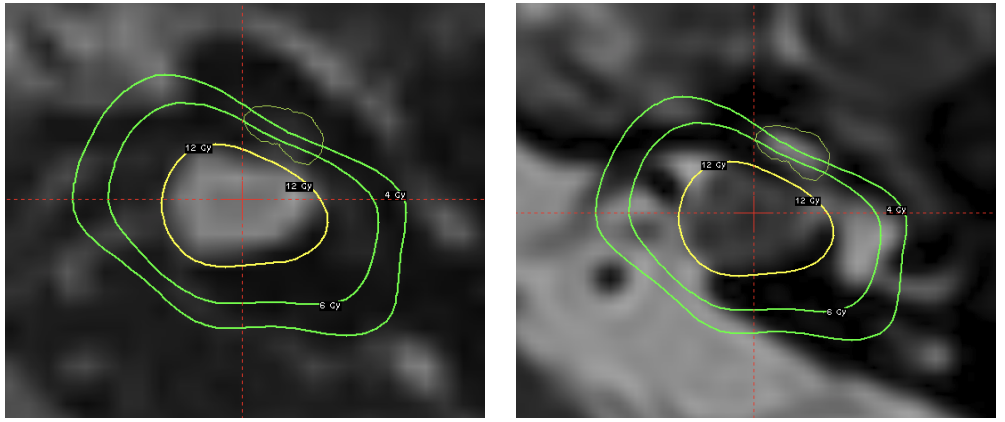
Introduction: The G-frame angle can simplify the process of planning Gamma Knife radiosurgery (GKRS). Selecting an optimal G-frame angle can help avoid collisions and reduce dose to organs at risk (OARs). This study investigates intracanal vestibular schwannoma (VS) planning technique utilizing adjustments to minimize the radiation dose to the cochlea. The objective was to assess whether this optimization could achieve meaningful cochlear dose reduction without degrading quality parameters of the treatment plan.

Materials and Methods: The analysis was conducted on a cohort of 10 patients with intracanal vestibular schwannomas. For each case, two distinct Gamma Knife treatment plans were created: a standard clinical plan using conventional frame coordinates, and an angle plan employing frame angle adjustments specifically aimed at reducing beam intersection with the cochlea. The plans were compared using standard dosimetric metrics, including minimum dose, coverage, selectivity, gradient index, and the percentage volume of the cochlea receiving 4 Gy (V4Gy) and 6 Gy (V6Gy). Statistical comparison was performed by one-way ANOVA.

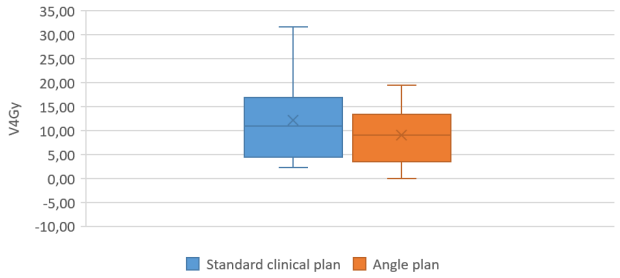


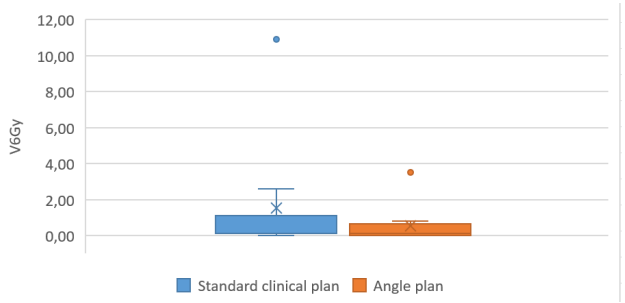
Angle plan

Results: The analysis revealed no statistically significant difference between the standard and angle plans in terms of the target minimum dose, coverage, selectivity and gradient index (one-way ANOVA p-values were 0.8579, 1, 0.7813 and 0.8882, respectively. The cochlea V4Gy showed no significant change (p-value = 0.1135). However, a statistically significant reduction was achieved in the cochlea V6Gy (p-value = 0.0354).



Standard clinical plan





Conclusion: Using the G-frame angles is a valuable strategy in Gamma Knife treatment planning for VS patient as it gives improved treatment plans with lower cochlear doses. This technique achieves a significant decrease in cochlear V6Gy without adversely affecting the coverage, selectivity and gradient index. This approach holds potential to improve hearing preservation rates, offering a practical method that can be seamlessly incorporated into the standard radiosurgical workflow.

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