

AbstractID: 7148 Title: Improved Patient Treatment with Leksell Gamma Knife Automatic Positioning System

Purpose: To determine whether the implementation of the Automatic Positioning System for the Leksell Gamma Knife leads to better and more conformal treatment plans than the use of the earlier manual positioning system.

Method and Materials: Treatment plans from a Gamma Knife Center with an 11 year history of use of the manual positioning Model U Gamma Knife (2482 treatments) and a one year history with the Model 4C with APS (233 treatments) were retrospectively examined. The labor-saving feature of the new device was expected to encourage more elaborate planning with smaller helmet sizes, leading to increased number of shots and better Conformality Index. Treatment of patients with non-malignant tumors in patients with long life expectancy were examined statistically, as well as metastatic tumors.

Results: The total number of shots per patient for all treatments increased from 7.3 to 10.8. Acoustic neuromas were treated with 10.8 shots with the new APS system versus 6.5 with the old system, while target coverage increased from 97.7% to 98.7% and Conformality Index improved from 1.89 to 1.50, all significant at $p < 0.05$. Meningiomas showed similar increase in shots (from 9.3 to 14.9), improvement in coverage from 96.0% to 97.8% and improvement in Conformality Index from 1.81 to 1.55. Metastatic tumors were treated with more shots and better coverage while the CI was slightly decreased.

Conclusion: The burden of all new technology, especially when it is costly, is to demonstrate evidence based improvements in treatment. The Leksell APS system simultaneously reduces error rate through a Record and Verify system while encouraging planners to create more elaborate plans without straining staff resources or patient tolerance. It is too early to demonstrate better patient outcome but the trend is encouraging.

Conflict of Interest (only if applicable):