Clinical Outcome of Gamma Knife Radiosurgery for Skull Base Meningiomas after Surgery: Effect for Residual Tumors and Preservation of Cranial Nerve Function and Recurrence Rates

Objectives: To evaluate long-term outcome of residual skull base meningiomas after gamma knife (GK) with our conservative strategies, avoiding excessive irradiation to cranial nerves. Methods: Sixty-nine patients (51 women, mean age 57.9 y/o) were included and 55 of them underwent surgery before GK. The mean follow-up period was 98.0 months (median 106.2). The mean tumor volume was 5.74ml (0.2-25.6). Forty-eight patients had residual tumors in the cavernous sinus region. The mean marginal and maximal doses were 13.2Gy (10-15) and 26.4Gy. To prevent cranial nerve injuries, the doses for the lateral wall of the cavernous sinus were set below 13Gy, and those near the superior orbital fissure were below 18Gy.

Results: Tumor regrowth was observed in 7 patients and the other two showed recurrence outside the irradiation areas. Additional treatments were done in six patients; repeated surgery for three including two with large-sized residual tumors (>18 ml), and repeated GK for three including two with recurrence outside the irradiated areas. No regrowth was observed in the patients without preceding surgeries. The actuarial progression free survival rate was 88.0%, and the actuarial tumor volume decrease rate was 38.7 % at 10years. Malignant transformation were not observed. Preexisting abducens nerve paresis got worsened in one patient. Improvement of visual or oculomotor function was observed in four patients. Tumor volume >10ml was significantly associated with tumor regrowth.

Conclusion: GK with our conservative planning is safe and effective over the long term for skull base meningiomas.