Cavernous sinus hemangioma Gamma Knife surgery

A study aimed to evaluate the efficacy of Gamma Knife surgery (GKS) on cavernous sinus hemangioma and to analyze the temporal volume change.

Cho et al. retrospectively reviewed the clinical data of 26 cavernous sinus hemangioma patients who were treated with GKS between 2001 and 2017. Before GKS, 11 patients (42.3%) had cranial neuropathies and 5 patients (19.2%) complained of headache, whereas 10 patients (38.5%) were initially asymptomatic. The mean pre-GKS mass volume was 9.3 mL (range, 0.5-31.6 mL), and the margin dose ranged from 13 to 15 Gy according to the mass volume and the proximity to the optic pathway. All cranial neuropathy patients and half of headache patients showed clinical improvement. All 26 patients achieved mass control; remarkable responses (less than 1/3 of the initial mass volume) were shown in 19 patients (73.1%) and moderate responses (more than 1/3 and less than 2/3) in 7 patients (26.9%). The mean final mass volume after GKS was 1.8 mL (range, 0-12.6 mL). The mean mass volume at 6 months after GKS was 45% (range, 5-80%) compared to the mass volume before GKS and 21% (range, 0-70%) at 12 months. The higher radiation dose tended to induce more rapid and greater volume reduction. No treatment-related complication was observed during the follow-up period. GKS could be an effective and safe therapeutic strategy for CSCH. GKS induced very rapid volume reduction compared to other benign brain tumors [1].

An international multicenter study was conducted to review outcome data in 31 patients with CSH. Eleven patients had initial microsurgery before SRS, and the other 20 patients (64.5%) underwent Gamma Knife SRS as the primary management for their CSH. Median age at the time of radiosurgery was 47 years, and 77.4% of patients had cranial nerve dysfunction before SRS. Patients received a median tumor margin dose of 12.6 Gy (range 12-19 Gy) at a median isodose of 55%. RESULTS Tumor regression was confirmed by imaging in all 31 patients, and all patients had greater than 50% reduction in tumor volume at 6 months post-SRS. No patient had delayed tumor growth, new cranial neuropathy, visual function deterioration, adverse radiation effects, or hypopituitarism after SRS. Twenty-four patients had presented with cranial nerve disorders before SRS, and 6 (25%) of them had gradual improvement. Four (66.7%) of the 6 patients with orbital symptoms had symptomatic relief at the last follow-up. CONCLUSIONS Stereotactic radiosurgery was effective in reducing the volume of CSH and attaining long-term tumor control in all patients at a median of 40 months. The authors' experience suggests that SRS is a reasonable primary and adjuvant treatment modality for patients in whom a CSH is diagnosed. [2].

Between August 2011 and April 2014, 7 patients with CSHs underwent GKS. GKS was performed as the sole treatment option in 5 patients, whilst partial resection had been performed previously in 1 patient and biopsy had been performed in 1 patient. The mean volume of the tumors at the time of GKS was 12.5±10.2 cm3 (range, 5.3-33.2 cm3), and the median prescription of peripheral dose was 14.0 Gy (range, 10.0-15.0 Gy). The mean follow-up period was 20 months (range, 6-40 months). At the last follow-up, the lesion volume had decreased in all patients, and all cranial neuropathies observed prior to GKS had improved. There were no radiation-induced neuropathies or complications during the follow-up period. GKS appears to be an effective and safe treatment modality for the

management of CSHs [3].

A retrospective analysis of 7 patients with CS hemangiomas treated by GKS between 1993 and 2008. Data from 84 CS meningiomas treated during the same period were also analyzed for comparison. The patients underwent follow-up magnetic resonance imaging at 6-month intervals. Data on clinical and imaging changes after radiosurgery were analyzed.

Six months after GKS, magnetic resonance imaging revealed an average of 72% tumor volume reduction (range, 56%-83%). After 1 year, tumor volume decreased 80% (range, 69%-90%) compared with the pre-GKS volume. Three patients had > 5 years of follow-up, which showed the tumor volume further decreased by 90% of the original size. The average tumor volume reduction was 82%. In contrast, tumor volume reduction of the 84 cavernous sinus meningiomas after GKS was only 29% ($P < .001$ by Mann-Whitney U test). Before treatment, 6 patients had various degrees of ophthalmoplegia. After GKS, 5 improved markedly within 6 months. Two patients who suffered from poor vision improved after radiosurgery.

GKS is an effective and safe treatment modality for CS hemangiomas with long-term treatment effect. Considering the high risks involved in microsurgery, GKS may serve as the primary treatment choice for CS hemangiomas [4].

References

1)
Cho JM, Sung KS, Jung IH, Chang WS, Jung HH, Chang JH. Temporal Volume Change of Cavernous Sinus Cavernous Hemangiomas after Gamma Knife Surgery. Yonsei Med J. 2020 Nov;61(11):976-980. doi: 10.3349/ymj.2020.61.11.976. PMID: 33107242.
2)
Lee CC, Sheehan JP, Kano H, Akpinar B, Martinez-Alvarez R, Martinez-Moreno N, Guo WY, Lunsford LD, Liu KD. Gamma Knife radiosurgery for hemangioma of the cavernous sinus. J Neurosurg. 2017 May;126(5):1498-1505. doi: 10.3171/2016.4.JNS152097. Epub 2016 Jun 24. PMID: 27341049.
3)
Xu Q, Shen J, Feng Y, Zhan R. Gamma Knife radiosurgery for the treatment of cavernous sinus hemangiomas. Oncol Lett. 2016 Feb;11(2):1545-1548. doi: 10.3892/ol.2015.4053. Epub 2015 Dec 23. PMID: 26893777; PMCID: PMC4734249.
4)
Chou CW, Wu HM, Huang CI, Chung WY, Guo WY, Shih YH, Lee LS, Pan DH. Gamma knife surgery for cavernous hemangiomas in the cavernous sinus. Neurosurgery. 2010 Sep;67(3):611-6; discussion 616. doi: 10.1227/01.NEU.0000378026.23116.E6. PMID: 20647963.