

S8-The Effect of Gamma Knife Radiosurgery for Treatment of Trigeminal Neuralgia in Elderly Patients

Byung-chul Kim, Hwan-Soo Kim, Jun-Kyeung Ko, Beong Ik Hur,
Seung-Heon Cha, Chang-Hwa Choi

부산대학교 의과대학 신경외과학교실

Objective: Gamma knife radiosurgery (GKRS) is the least invasive surgical option for patients with trigeminal neuralgia (TN). To assess the effect of GKRS for elderly patients group in comparison with younger patients group, the author analyzed the outcomes of GKRS in each group.

Methods: A total 33 consecutive patients who were followed for more than 2 years were treated GKRS for typical TN between 2003 and 2012. The elderly patient was more than 65 years old. The mean maximum radiation dose was 80 Gy (70-85 Gy), and 4 mm collimator was used to target the radiation to the root entry zone. Outcomes were qualified based on Barrow Neurological Institute (BNI) pain scale by medical record review and telephone request.

Results: The mean age of elderly patients group and younger patients group was 74.0 years and 47.7 years, respectively. The mean follow-up period was 51.7 months (24.2-124.8 months). The actuarial rates of a good outcome at 1 and 2 years after GKRS were 94.4% and 88.9% for elderly patients group, 100% and 93.3% for younger patients group. The rate of more improved BNI scale on 1 years after GKRS than preoperative BNI scale were 77.8% for elderly patients group and 60% for younger patients group ($p=0.448$). There was no statistically significant difference in pain control rate between two groups ($p=0.453$). There was no complication of GKRS in elderly patients group.

Conclusion: According to our study, GKRS seems to be an effective treatment modality for not only elderly patients but also younger patients, and there is no difference in outcome of GKRS. GKRS is a safe, effective and minimally invasive technique which might be considered a first line therapy for elderly patients whom a more invasive kind of treatment is unsuitable.



S9-Stereotactic Radiosurgery For Secondary Trigeminal Neuralgia Due To Benign Lesions

Kyung Rae Cho, Hojun Seol, Do-Hyun Nam, Doosik Kong, Jung-Il Lee

Department of Neurosurgery, Samsung Medical Center, Sungkyunkwan University School of Medicine, Seoul, Korea

Objective: This study was performed to evaluate outcome of stereotactic radiosurgery for facial pain related to benign intracranial lesions.

Methods: Retrospective analysis was done in 54 patients (43 female and 11 male) with facial pain related to benign intracranial lesions and treated with gamma knife radiosurgery (GKRS) from 2002 to 2012. Pathological or radiological diagnoses were meningioma (32), vestibular schwannoma (12), trigeminal schwannoma (7), epidermoid (2), and AVM (1). The median follow-up period was 47 months. Median prescription tumor margin dose was 13 Gy (12-15 Gy) and maximum dose from 60 to 80 Gy was given additionally to trigeminal nerve in 8 patients.

Results: Forty-four of 54 patients (81.5%) experienced BNI score of I-III at 6 months following GKRS. Pain recurred in 12 patients among those who showed initial improvement. Nine patients underwent additional procedure including repeated GKRS for persistent or recurrent pain in 6 patients. Meanwhile, only 2 patients revealed tumor progression that required further treatment.

Conclusion: Effective tumor control is possible with GKRS. However, probability of long term satisfactory pain control is lower than that of tumor control. Repeated GKRS may be considered for recurrent pain even though there is no tumor progression.



S10-Surgical Treatment of Glossopharyngeal neuralgia: Microvascular Decompression and Gamma Knife Radiosurgery

Young Hwan Ahn

Department of Neurosurgery, Ajou University School of Medicine, Suwon, Korea

Objective: Glossopharyngeal neuralgia (GPN) is a very rare cranial rhizopathic condition, with 0.2-1% incidence of that of trigeminal neuralgia. Neurovascular conflict at the level of the root exit zone of cranial nerves IX and X is believed to be the cause of this intractable neuralgia in most cases.

Methods: Treatment modalities for GPN include medications, glossopharyngeal rhizotomy, Gamma knife radiosurgery, and microvascular decompression (MVD). In this series, 24 patients with medically intractable GPN were treated surgically; 22 patients with MVD without additional procedure such as cranial nerve rootlet section and 2 patients with Gamma knife radiosurgery.

Results: 22/22 patients treated with MVD had immediate relief of preoperative pain and pain recurred in one patient who did not have a definite offending vessel during the follow-up period (12 months to 17 years). In two patients, no specific neuro-vascular conflict at the REZ of cranial nerves IX and X was observed. There was no mortality. Three patients experienced short-term complications such as hoarseness, or swallowing difficulty which resolved gradually. However the neuralgic pain remained and still so severe that they need medications in 2/2 patients treated with gammaknife radiosurgery. One patient want to be treated with MVD as his pain was not enough to tolerate.

Conclusions: Microvascular decompression is an effective method to treatment of glossopharyngeal neuralgia. However, the role of Gammaknife radiosurgery for glossopharyngeal neuralgia is still not conclusive.



S11-Prognosis and Risk Factor of Peritumoral Edema after Gamma Knife Radiosurgery for 722 Incidental Meningiomas

**Hyun Ho Jung, Young Goo Kim, Young-Cheol Na, Won Seok Chang,
Jin Woo Chang, Young Gou Park**

*Division of Stereotactic and Functional Neurosurgery, Yonsei Gamma Knife Center, Department of Neurosurgery,
Yonsei University College of Medicine, Seoul, Korea*

Objective: To analyze the risk and prognosis of peritumoral edema (PTE) in incidental finding of meningioma treating with gamma knife radiosurgery.

Methods: Between May 1989 and December 2011, 1106 patients were treated with GKS as primary or adjuvant modality for intracranial meningioma. Among these patients, we excluded some cases which were less than 12 months follow-up with imaging or with multiple meningioma or postoperative remnant.

Results: 722 patients were included. Median volume was 3.5 cc (range 0.1-59.6), and we prescribed mean marginal dose of 14.0 Gy (range 7.5-25) with 50% isodose line. All the patients were followed up with MRI annually if the new symptom did not occur. Median follow-up period was 42.2 months (range 6-137.1). In group (n=35) of meningioma with PTE before GKS, PTE aggravated in 21 patients (60%). Whereas in group (n=687) of meningioma without PTE, new PTE appeared in 90 (13.1%). So the relative risk of PTE aggravation after GKS is 4.58 times bigger in meningioma with PTE group. The location of meningioma was not correlated significantly, but intraventricular (46.2%), parasagittal (25.2%), convexity (17%) meningioma were showed higher incidence than other sites, such as falx (11.4%), anterior or middle fossa (10.7%), tentorium (11.4%).

Conclusions: Tumor volume and the PTE before GKS for incidental meningioma was significant risk factor for PTE aggravation after GKS, so these factors must be clearly evaluated and warned to patient.



S12-Characteristic Conformation of the Vertebral Artery Causing Vascular Compression Against Root Exit Zone of the Facial Nerve in Patients with Hemifacial Spasm

Jung-Soo Park, Eun-Jeong Koh, Ha-Young Choi, Jong-Myong Lee

Department of Neurosurgery, Research Institute of Clinical Medicine, Institute for Medical Sciences, Chonbuk National University Medical School and Hospital, Jeonju, Korea

Objective: It is well-known that hemifacial spasm is caused by tortuous offending vessels nearby facial nerve resulting in compression of facial nerve root exit zone. But the definitive mechanism of offending vessel formation still remains unclear. In this study we attempt to hypothesize that vascular angulation and tortuosity, resulting in vascular compression against facial nerve root exit zone, probably caused by uneven vertebral artery blood flow.

Methods: This retrospective study involved 120 patients with hemifacial spasm and 188 persons of control group. The presence ratio of dominant vertebral artery and laterality of vertebrobasilar junction based on vertical line from top of basilar artery were checked in both groups and we analyzed morphological characteristics of vertebrobasilar arterial system in HFS patients who showed DVA (type 1, VBJ is same side with dominant VA; type 2, 2 mm within the midline; type 3, opposite side to dominant VA).

Result: Compared with the rate in the control group, the rate of showing dominant VA was higher in the patient group (54% versus 71%, $p < 0.05$). In left HFS patients group had more left dominant VA ($p < 0.05$) and right group showed more right VA dominance compared with controls ($p < 0.01$). The laterality of VBJ was more frequently showed same side of dominant VA and involving side of HFS. In cases of the literalities of DVA and involved HFS side were same, type 1 was presented mainly than other patterns and lateralities were opposite side, type III patterns were noted mainly.

Conclusion: We hypothesized that the vertebral artery dominance is critical role of angulation and tortuosity of peri-vertebrobasilar junction vessels resulting in neurovascular compression of facial nerve root exit zone that can lead to HFS.



S13-The effect of microvascular decompression in trigeminal neuralgia

김환수, 최창화, 고준경, 이재일

부산대학교 의과대학 신경외과학교실

Objective: Various surgical treatments have been used to treat trigeminal neuralgia (TN). Among these treatments, microvascular decompression (MVD) has been the most attractive treatment modality because it provides the highest rates of long-term patient satisfaction and the lowest rates of pain recurrence. The purpose of this retrospective study was to identify preoperative imaging characteristics and surgical findings that predict pain relief after MVD for trigeminal neuralgia.

Methods: 88 cases of 86 TN patients who were suffered from the TN underwent surgery in our hospital from 1994 to 2013 with follow-up ranging from 4 months to 15 years (mean follow-up duration was 28.3 months). 75 patients underwent MVD only, and 8 underwent partial sensory rhizotomy (PSR) with or without MVD. We analyzed patient's characteristics, clinical results, offending vessels, complications.

Results: Mean age of patients is 49.3 years. Right side symptom was slightly dominant (61.4%). Duration from symptom onset to outpatient department visit was 39.1 months. Most common site of TN were V2 and V3 division of trigeminal nerve, and the superior cerebellar artery (SCA) was the most commonly compressing vessel, and was found in 41 patients.

At last follow-up, pain complete cured in 57, pain sometime occurred in 17 which could be relieved by oral medicine, 12 cases could not be controlled effectively by medicine.

Overall cure rate and efficacy of MVD of TN in our hospital was 64.8% and 84.1%, respectively. Efficacy rate after MVD with PSR was 50.0%, but for patients performed only PSR, it was 66.7%.

Conclusion: MVD proved to be safe and moderately effective in the management of TN. Identifying the responsible vascular exactly and handling it reasonably were important. And PSR with or without MVD provide a safe and effective outcome, when vascular compression is considered insignificant at operation field.



S14-Pilot Study of Gamma-knife Surgery-incorporated Systemic Chemotherapy Omitting whole Brain Radiotherapy for the Treatment of Elderly Primary Central Nervous System Lymphoma Patients with Poor Prognostic Scores

Cho J, J Kim, HJ Ryu, HG Roh, HW Chung, YC Koh, MH Lee, YH Ko, SY Kim

Department of Neurosurgery, Konkuk University School of Medicine, Seoul, Korea

Systemic chemotherapy followed by whole brain radiotherapy (WBRT) is a widely used treatment strategy for patients with primary central nervous system lymphoma (PCNSL). However, the outcome of this treatment strategy in elderly patients, particularly with a poor prognostic score, was disappointing compared with younger patients, and the deterioration of cognitive function after WBRT is more problematic in these patients. To avoid this debilitating complication of WBRT and increase treatment efficacy in elderly patients, we designed systemic chemotherapy that incorporated interim gamma-knife surgery (GKS) treatment for elderly PCNSL patients (age ≥ 65 years), omitting WBRT in this pilot trial. A total of four elderly patients with a poor prognostic score based on an International Extranodal Lymphoma Study Group were enrolled in this pilot clinical trial. All study patients acquired complete response and showed stable or improved neuropsychological function during the disease-free state. The median progression-free survival was 9.5 months (range 8.6-22.5 months), and the median overall survival was 15.8 months (range 13.3-25.1 months), which were likely to be similar to those of the chemotherapy followed by WBRT for those patients. This pilot study demonstrated that GKS-incorporated systemic chemotherapy can obtain complete response with high probability and considerably long survival, which suggests that this treatment strategy is efficient and neuropsychologically safe for elderly PCNSL patients with a poor prognostic score.



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