

Gamma Knife Radiosurgery for Trigeminal Neuralgia

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Trigeminal neuralgia (TN) is a facial pain syndrome characterized by a severe electrical, shooting pain lasting seconds to minutes that is confined to one or more distributions of the trigeminal nerve. There is a number of treatment options including medical therapy, microvascular decompression (MVD), percutaneous approach, and stereotactic radiosurgery.

Medication only helps in approximately 75% of patients, and patients will frequently become refractory to medication over time. If medical therapy fails or not tolerated, there exist two primary surgical therapies: MVD and ablative percutaneous procedures. These surgical procedures can effectively control the pain, however, that also have risks of complication including stroke, hemorrhage, CSF leakage, and trigeminal dysfunction. SRS provided an alternative treatment that is minimally invasive yet effective and causes few side effects.

The relationship between postprocedure numbness and efficacy suggests that GK-SRS works by blocking axonal transmission. As predicted by model of radiation injury, both the time to effective pain relief and numbness are delayed, although pain relief frequently occurs many months before any side effects are experienced. In 1996, Konziloka et al. published the results of a multicenter trials of GK-SRS that standardized the target. A single 4mm isocenter was applied to the trigeminal nerve 2 to 4 mm anterior to the junction of the nerve at the pons as seen on axial and coronal MRI scan.

In general, treatment outcomes are good correlation between the different series. The range of patients achieving good relief (BNI I to III) is 69% to 94% with 22% to 76% achieving complete pain relief on no medication (BNI I). A minimum treatment dose of 70 Gy appears necessary for a good outcome, but dose of 90 Gy and above do not appear provide additional pain relief.

Between 1996 to 2010, total 128 patients with trigeminal neuralgia were treated by gamma knife radiosurgery in Yonsei Gamma Knife Center. Pain improvement was achieved in 92.7% of patients (BNI 1 to III). Radiation dose over 80 Gy and short symptom duration was correlated with good treatment outcomes. There were no serious complications, although 14.7% of patients were suffered from some degree of facial numbness.

In conclusion, stereotactic radiosurgery can provide effective pain control in patients with medically refractory trigeminal neuralgia, and the risks of serious complications are limited. Although the risks of complication from stereotactic radiosurgery are rare, the detail indications and availability should be conveyed to decreased these risks with patients considering treatment.