

# Gamma Knife® radiosurgery

## Trigeminal Neuralgia



### Introduction

Trigeminal neuralgia is one of the most severe pain syndromes any person can face. When medical management fails to control the pain of trigeminal neuralgia, patients require surgical intervention. Effective surgical procedures include craniotomy and microvascular decompression, percutaneous ablative procedures, or stereotactic radiosurgery. All surgical procedures have variable but definite rates of risk and pain recurrence.

Unfortunately, many patients with trigeminal neuralgia are poor craniotomy candidates because of advanced age or the presence of medical comorbidities. Stereotactic radiosurgery is the least invasive modality for such patients.

### Gamma Knife Radiosurgery Technique for Trigeminal Neuralgia

For trigeminal neuralgia radiosurgery, a 3-D volume acquisition MRI using a gradient pulse sequence (divided into 1 mm thick slices) is performed in order to cover the entire region and surrounding critical structures. A T2 weighted 3-D volume sequence is performed to visualize the cranial nerves and can be helpful in certain patients, particularly after prior microvascular decompression.

In Gamma Knife® radiosurgery a dose of 75-90 Gy is typically prescribed to the 100% (maximum) isodose line. After radiosurgery, patients are followed up with serial clinical assessments which are commonly requested at 3 months and then annually or as needed.

### Clinical Results

Most centers report an average latency to pain relief after radiosurgery of approximately 1 to 2 months. A study from University of Pittsburgh demonstrated that 89% of patients responded to treatment at a median of one month. They found that patients with typical trigeminal neuralgia, patients who underwent GKSR as their initial surgical procedure, and patients who underwent earlier GKSR (< 3 years) after pain onset had faster pain relief (grade I to IIIb). The median time to achieve complete pain relief (grade I) was five months. By 12 months after GKSR, 11% of patients still had pain. The experience indicates that the majority of

patients experience lasting, satisfactory pain reduction with few complications after GKSR. In this series, 75% of patients achieved or maintained pain control (BNI grade I-IIIb), 59% had pain relief at 3 years, 43% maintained relief at 5 years, and 29% were still controlled with or without medications at 10 years.

### Conclusion

Radiosurgical results appear similar, or perhaps less satisfactory than those after a first microvascular decompression. For this reason many clinicians continue to advocate a microvascular decompression for younger patients suitable for invasive surgery. In addition, the benefit of decompression is reduced when performed a second time, or for recurrent trigeminal neuralgia. On the other hand, GKSR is clearly well tolerated, has a better safety profile, and an acceptable degree of benefit that appears consistent amongst centers. Efficacy appears similar to the different rhizotomy surgeries.

Gamma Knife radiosurgery has become a well documented management option for patients with trigeminal neuralgia that is both safe and effective. It is the least invasive surgical option. Reports from centers worldwide show consistent outcomes and longer term data is now available from numerous centers. Outcomes data is consistent because methods of targeting and radiosurgical delivery have been consistent.

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