GAMMA KNIFE RADIOSURGERY FOR TRIGEMINAL NEURALGIA

MACQUARIE UNIVERSITY Hospital

Trigeminal Neuralgia (**TGN**) is a severe, usually one sided, lancinating facial pain in one or more trigeminal nerve distributions with a prevalence of 70/100,000 (1). This condition can be extremely debilitating and has a dramatic impact on quality of life. The initial treatment is medical management; however, when this is ineffective or side effects become limiting, then a surgical alternative is warranted such as; radiosurgery, percutaneous rhizotomy or microvascular decompression.

Key Points

- Gamma Knife Radiosurgery (GKSRS) is a minimally invasive alternative to open surgery for older patients or patients with medical comorbidities.
- The initial pain response rate is 90%
- Radiosurgery can be safely repeated to regain pain control if medically refractory pain recurs.

Gamma Knife Radiosurgery

GKSRS has been utilized to treat over 56,617 patients worldwide with TGN during the last 30 years with 4,468 patients being treated in 2014 alone. This procedure is an established component of the management paradigm and is supported by peer-reviewed publications.

Clinical Data

Pain Control:	Initial pain control develops over the first month and occurs in 89-92% of patients treated (2,3,4). Pain control at 1 year is reported in 76-80% of patients, at 3-years the rate is 60-72%, at 5 years the rate ranges from 46-59%, and at 10 years there are 30-45% of patients that maintain a procedural benefit (2,3,4).
Quality of life:	Multiple indices have been tested that confirm a significantly improved after GKSRS treatment for TGN (5,6). In addition, 90% of patients retrospectively were very satisfied and would repeat the procedure if required (7).
Multiple Sclerosis:	GKSRS provided reasonable pain control in 83% of patients at 1 year and 54% of patients at 5 years (8).
Repeat GKSRS:	87% of patients achieved initial pain relief with repeat GKSRS. At 1 year this level of control was maintained, while at 3-years 69.8% and at 5-years 44.2% of patients had beneficial pain control (9). A third procedure can be performed if necessary with 47% of patients having complete pain relief and 94% experiencing improvement (10).

Risks

- Trigeminal sensory loss occurs at a rate of 10% to 20% of patients, but may be associated with improved long term pain control from GKSRS (2,3)
- Numb burning or deafferentation pain occurs in less than 1% of patients (2,3).

Referral Recommendations

- Patients who would prefer the least invasive approach to pain management.
- Patient age greater than 65 years or comorbidities that increase the risks associated with a microvascular decompression.

- Previous unsuccessful microvascular decompression.
- If you are unsure whether a patient would be a candidate for GKSR, our team would be pleased to provide a consultation.

What your Patient should know

Gamma knife radiosurgery is a safe and proven effective procedure, which remains the least invasive of surgical approaches for TGN treatment. This is a single procedure, designed to disrupt the sensory fibers of the trigeminal nerve resulting in a significant reduction or elimination of the abnormal pain response. There are no incisions and the patient does NOT experience perceived radiation side effects such cognitive decline or hair loss. Patients do not require an anesthetic and can maintain their current medications.

Radiosurgery Technique Protocol for Trigeminal Neuralgia

1. Patients are treated in a single outpatient procedure.
2. A Leksell stereotactic frame is applied under mild sedation / local anaesthetic.
3. High-resolution axial imaging MRI or CT) is obtained.
4. Radiosurgery dose planning (40Gy margin dose) is created emphasizing conformality, selectivity and anatomic considerations.
5. The patient is positioned in the Gamma Knife unit and the radiosurgery treatment is administered.
6. Patients are usually discharged within 2 hours of a completed procedure.
7. Clinical follow-up is requested at 6-months and then as needed. Patients that have a recurrence of pain can be retreated with radiosurgery and remain viable candidates for other interventional strategies.

The expanded technical elements of this procedure are detailed in previous publications (3,9).

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