

## CyberKnife Radiosurgery for Trigeminal Neuralgia

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Romanelli P (November 02, 2017) CyberKnife Radiosurgery for Trigeminal Neuralgia. Cureus 9(11): a230

**Abstract**

**Objectives:** No large single-center long-term prospective reports are available about the outcomes of Cyberknife Radiosurgery for Trigeminal Neuralgia. This paper provides a prospective outcome analysis on 138 patients with minimum follow-up of 36 months.

**Methods:** A cohort of 138 patients affected by Trigeminal Neuralgia (TN) was treated by Cyberknife radiosurgery and prospectively followed.

Patients with typical TN and severe drug-resistant pain underwent image-guided robotic radiosurgery (Cyberknife, Accuray Inc., Sunnyvale, Ca). The treatment was performed in single session using a non-isocentric technique, delivering 60 Gy @ 80% isodose to a 6 mm retrogasserian target. Clinical re-evaluation was performed at 3, 6, 12, 18, 24 months and then continued on a yearly base.

**Results:** The median follow-up time was 52.4 months (range, 36-79 months). Significant pain relief was achieved in 129 out of 138 (93.5%) patients, after a median delay of 3 weeks (range 1-6 weeks). 109 patients (78.9%) were completely pain and medication-free (BNI pain class I) 6 months after treatment. 11 out of 138 patients (8%) who failed to achieve pain control after a minimum 6 months observation time underwent a second treatment, which induced pain remission. 24 out of 129 pain-free patients (18.6%) experienced recurrent pain within 3 years from the treatment and underwent retreatment with restoration of analgesia. Peak of recurrent pain was found 12 months after the first procedure (12 patients, 50%), while other 7 (29.2%) recurred after 18 months and 5 (20.8%) after 24 months. Overall, 35 patients (25.4%) required a second treatment, either due to primary failure or to recurrent pain. Actuarial pain control rate (BNI class I-IIIa) after 6, 12, 24, 36 months was, respectively, 93.5%, 85.8%, 79.7%, 76%. Afterwards, it remained stable. Figure 1 shows the actuarial rate of pain control after treatment. Overall 7 patients (5.1%) developed bothersome hypoesthesia: one patient out of 138 (0.7%) developed bothersome hypoesthesia (BNI grade IV) after a single treatment while 6 out of the 35 patients undergoing retreatment developed BNI grade III hypoesthesia (4.3% of the 138 initial cohort; 17.1% of the 35 patients receiving 2 treatments).

**Conclusions:** This is the largest series reporting about Cyberknife radiosurgery for trigeminal neuralgia. The technique here reported, targeting a 6 mm segment of the TN with a prescribed dose of 60 Gy, appears to be a safe and effective treatment for TN, with high pain control rates and an acceptable risk of sensory complications, which are typically found after re-irradiation.

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