

Trigeminal Neuralgia

Karna Sura

**Facility Advisers: Ann Maitz, MS; Peter Chen,
MD; Inga Grills, MD**

Beaumont Health System

Royal Oak, MI

Case Presentation

- 60-year-old female presents with left-sided facial pain for 20 years
- Under control with gabapentin 1200 mg TID for many years
- Two months ago, she developed intermittent 10/10 jolting pain for a few seconds at a time
- Worse with light touch or eating

Case Presentation

Physical exam

-General: NAD

-HEENT: MMM

-Neuro: Intense pain on light touch on the left V2 and V3 distribution

Background

- Affects approximately 15,000 patients per year
- Female predominance
- Divided into two different types
 - Type 1 (Typical): Predominantly sharp shock-like pain with pain-free intervals
 - Type 2 (Atypical): Burning, aching, or throbbing pain

Background Continued

- Classic symptoms include:
 - Sudden brief stabbing or lancinating pain
 - Most commonly unilateral but can be bilateral
 - Common triggers include talking, chewing, brushing teeth, and cold air
- Use Barrow Neurological Institute Pain Intensity Scale to determine intensity

Barrow Neurological Institute Pain Intensity Scale

I	No trigeminal pain, No medication
II	Occasional pain, Not requiring medication
III	Some pain, Adequately controlled with medication
IV	Some pain, Not adequately controlled with medication
V	Severe pain, No pain relief

Work-up

- Diagnosis of exclusion and based on clinical symptoms
- Order MRI of the brain to rule out structural abnormalities

Treatment options

- Medical
 - Anti-seizure medications (first line is carbamazepine), opiates, NSAIDs
 - Medical management is first line until medication intolerant
- Surgery
 - Microvascular decompression (MVD) [Gold Standard]
 - Rhizotomy with radiofrequency ablation, glycerol injection, or balloon decompression
- Radiotherapy
 - Stereotactic Radiosurgery (SRS)

Surgical Treatment

- Microvascular decompression
 - An invasive surgery to place a sponge or Teflon between the trigeminal nerve and the compressive loop of the artery
- Rhizotomy
 - A probe is inserted in the cheek through the foramen ovale and the trigeminal nerve is damaged through multiple techniques including ablation or mechanical damage

SRS versus Surgery

	Outcome	Toxicity
Brisman et al.	At 12 months, 68% with MVD and 58% with GKRS with complete pain relief At 18 months, 68% with MVD and 24% with GKRS with complete pain relief (p = 0.089)	No permanent complications in either arm
Henson et al.	Better acute pain relief in GR group but GKRS has less failure (Failure at last follow-up = 33% GR versus 13% GKRS [p = 0.0019])	54% in GR versus 30% in GKRS developed new facial numbness

Acronyms: MVD (Microvascular decompression), GKRS (Gamma Knife Radiosurgery), GR(Glycerol Rhizotomy)

GKRS prospective phase I trial (Regis et al.)

- n = 100, median follow up 12 months
- Median maximal dose was 85 Gy (range: 70-90 Gy)
- 83/100 patients were pain free at last follow-up
- 58/83 patients were medication-free
- 6 patients with mild facial paresthesia and 4 patients with mild hypoesthesia

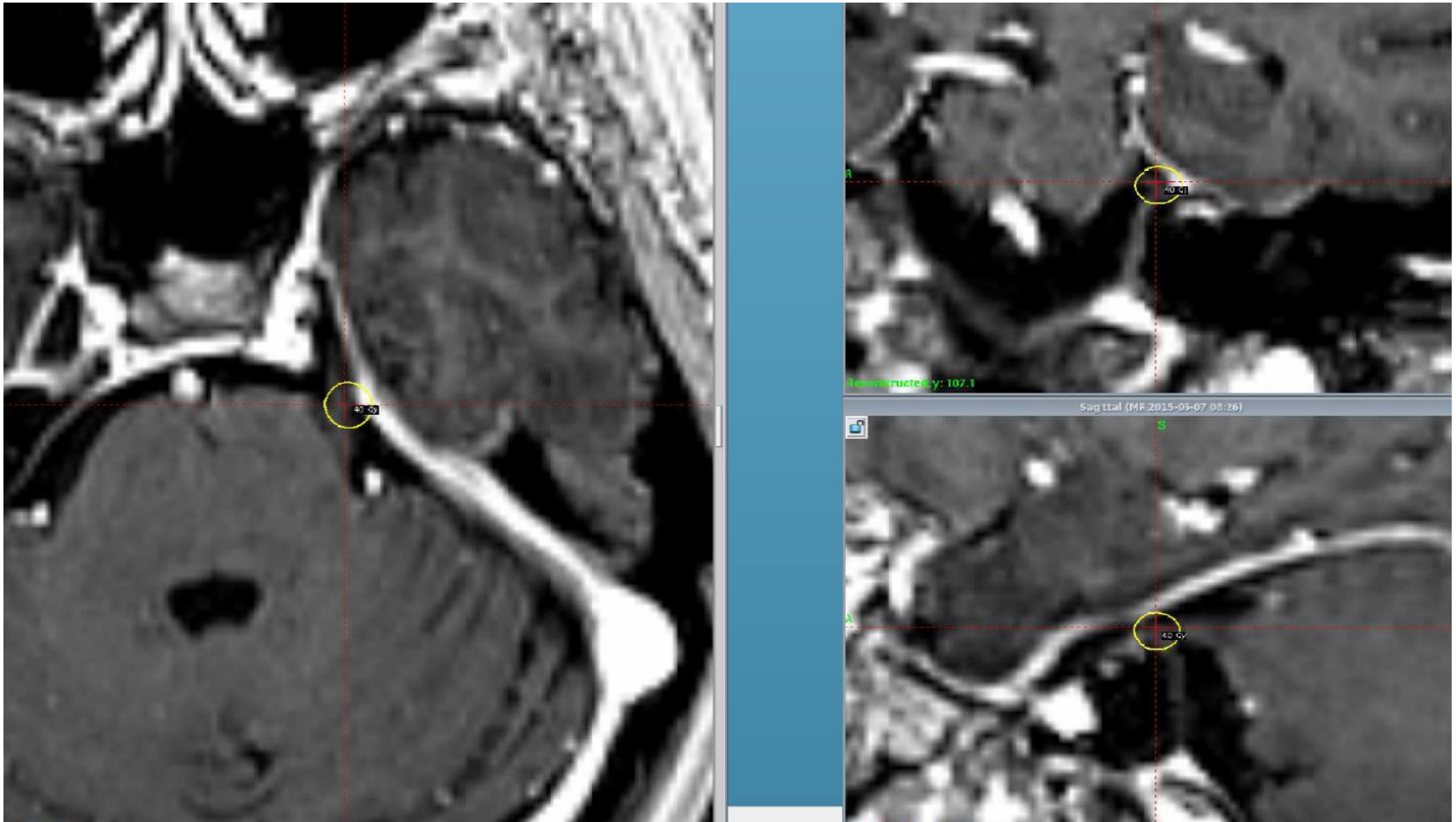
GAMMA KNIFE TREATMENT

Treatment Planning

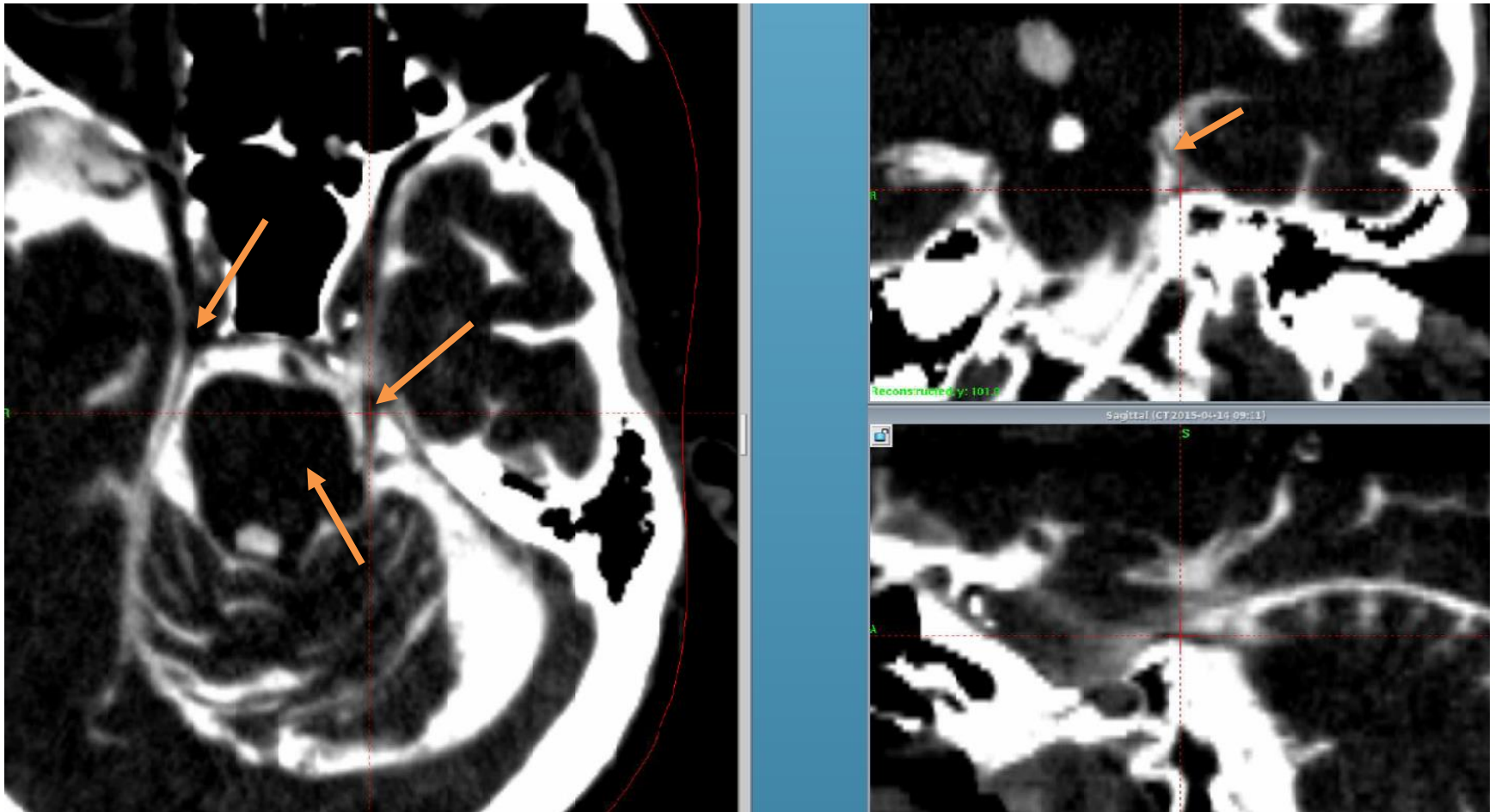
- One isocenter (shot) with a 4-mm collimator is placed over the trigeminal nerve on the affected side
- Prescription is 40 Gy at 50% isodose line (80 Gy max) with a range of 35-45 Gy (70-90 Gy max)



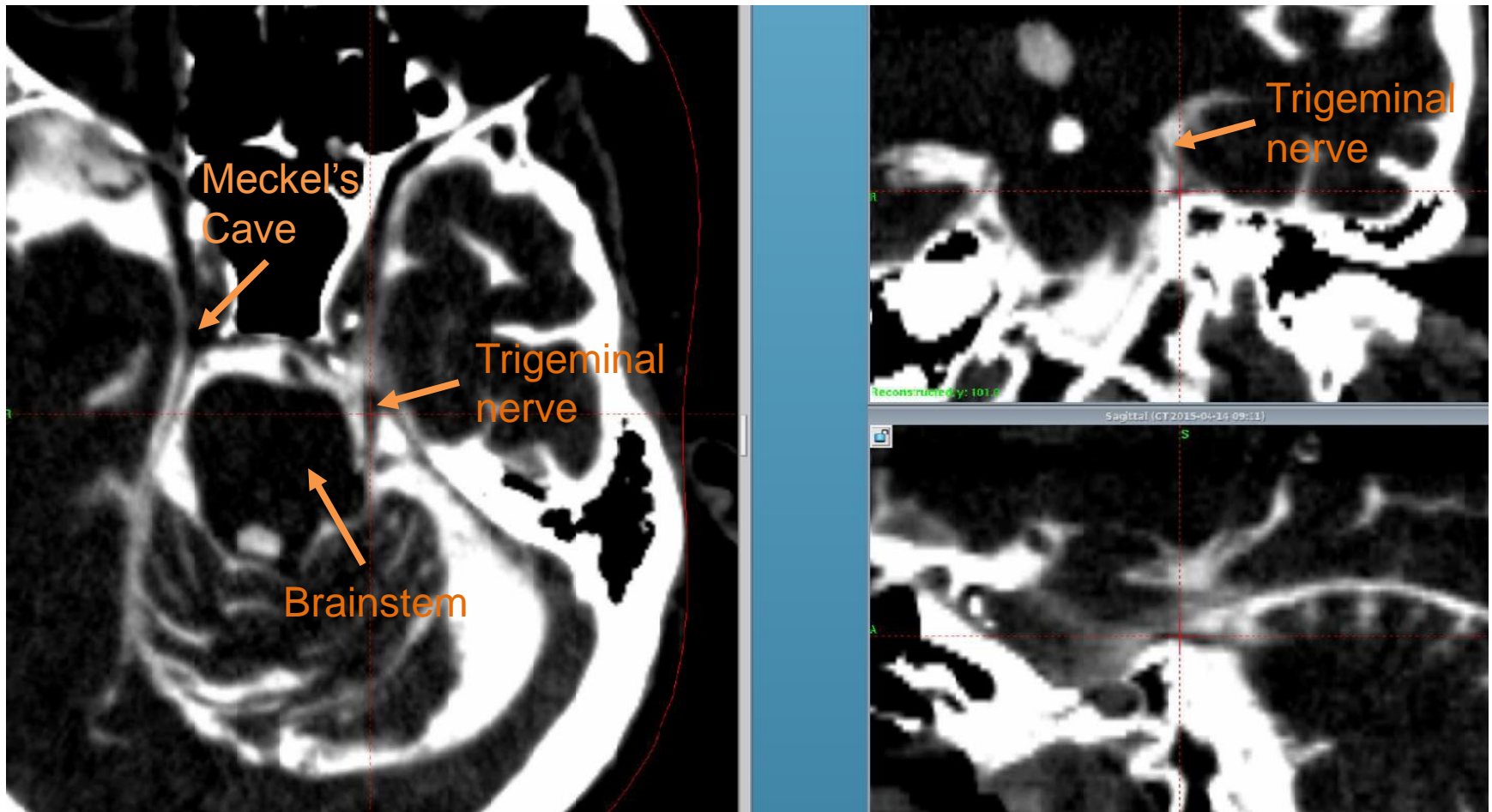
Treatment planning - MRI



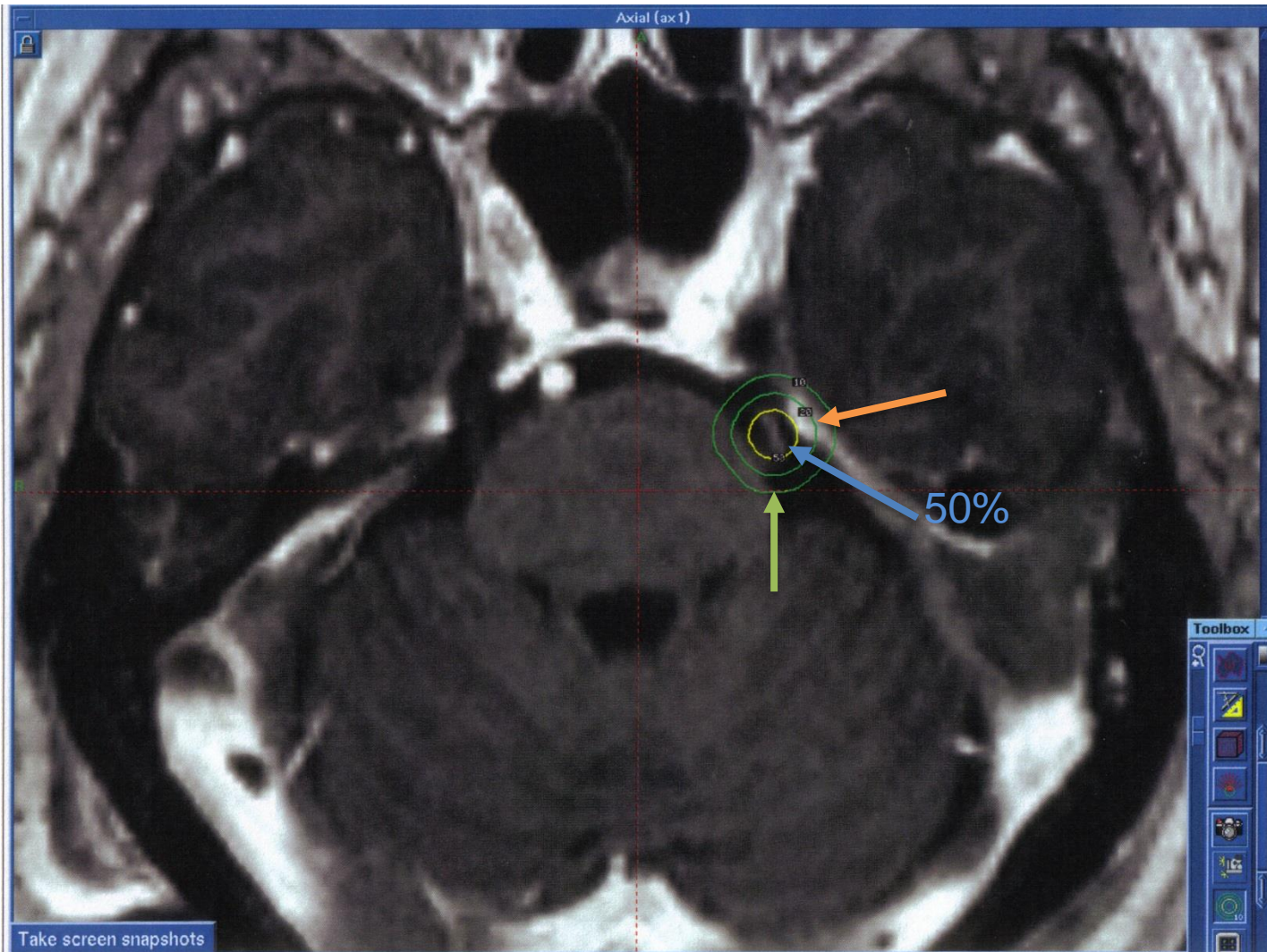
Treatment planning - CT cisternogram: Identify the structures



Treatment planning -CT cisternogram (only if MRI is contraindicated)



Isodose lines

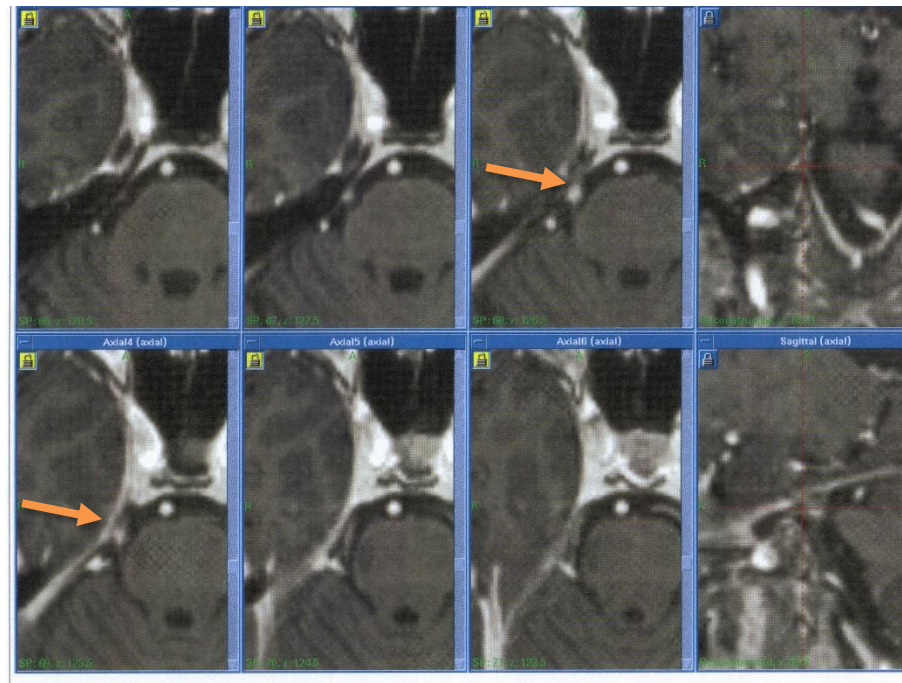


DVH

Name	Volume	Min	Max	Mean
A:1 tgn_TG The treatment zone	1.76 cm ³	0.5 Gy	80.0 Gy	11.6± 13.3 Gy
fifth nerve Entire 5 th nerve	83.0 mm ³	2.9 Gy	79.9 Gy	35.6± 23.1 Gy
brainstem	9.32 cm ³	0.1 Gy	19.8 Gy	1.3± 1.5 Gy

Follow-up

- Clinical follow-up with weaning of pain meds upon pain solution
- Enhancing region of nerve corresponds to treatment isocenter of previous treatment to trigeminal nerve (arrows below) on MRI



References

- Brisman, R. et al (2007) Microvascular decompression vs. gamma knife radiosurgery for typical trigeminal neuralgia: preliminary findings. *Stereotact Funct Neurosurg* 85(2-3):94-8.
- Henson, C.F. et al. (2005) Glycerol rhizotomy versus gamma knife radiosurgery for the treatment of trigeminal neuralgia: an analysis of patients treated at one institution. *Int J Radiat Oncol Bio Phys* 63(1): 82-90.
- Regis, J et al. (2006) Prospective controlled trial of gamma knife surgery for essential trigeminal neuralgia. *J Neurosurg* 104 (6): 913-24.