Viability of Second Gamma Knife Radiosurgery vs Percutaneous Retrogasserian Balloon Compression for Primary Trigeminal Neuralgia

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Learning Objectives

Establish treatment possibilities in the management of trigeminal neuralgia (TN) after one dosage of Gamma Knife Radiosurgery (GKRS).

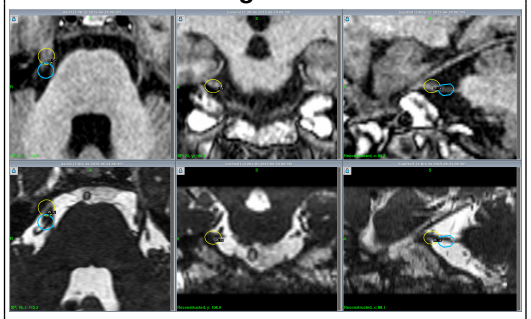
Introduction

Treatment in TN must be adapted in each patient. Surgeons must be conscious of medical, surgical, and radiation treatment modalities to suggest ideal management. The objective of this study is evaluate the efficacy of GKRS and Percutaneous retrograssian balloon compression (PRBC) in TN refractory for prior GKRS.

Methods

- Retrospective, comparative review were assessed in 121 subjects with no history of vascular compression. Subjects with a diagnosis of secondary TN, atypical facial pain as well as a history of vascular decompression were excluded.
- Second GKRS treatment plans involve a one third dose reduction and a target shift from the original target position. The shift is usually anterior with some overlap with the original target field allowed. Primary end points included post-operatory pain relief, carbamazepine level and complications.
- Continuous and categorical data were analyzed with the Wilcoxon rank-sum test, Pearson's chi-square test, or Fisher's exact test, as appropriate.

2.5 year follow-up second treatment using GKRS.



Blue 39 Gy , Yellow follow-up second dosage 25 Gy

Results

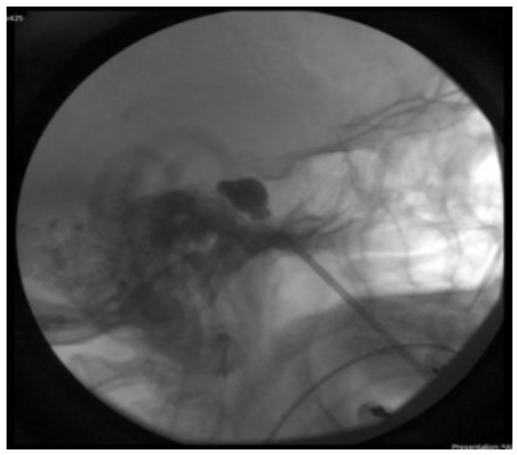
- Balloon compression had a highter mean post-operative pain control (GKRS 19% vs. PRBC 36.7% ; p=0.0281) and mean calculated pain control in VAS scale at 2 weeks (GKRS 22.7% vs. PRBC 47.3%; p=0.0236).
- No statistically significant difference in mean pain control at 3 months (GKRS 83.9% vs. PRBC 68.7% p=0.137), 18 months (GKRS 73.9% vs. PRBC 57.8%. p=0.098).
- Carbamazepine usage after 3 months (GKRS 37.7% vs. PRBC 31.9%); p=0.71). • The Kaplan-Meier pain control rate for GKRS group at 24 months was 79.3% +/- 1.3% (95%CI). Marginal dose (> 36 Gy or =40Gy), This treatment modality was a significant predictor of favorable outcome (p = 0.031) and low side effects.

Demographics

Number of Patients	59	62	NA
Age (years)	54.9 ± 9.81	48.4 ± 95	0.56
Sex			
Female	35 (68%)	32 (60%)	0.56
Male	24 (32%)	30 (40%)	
Body-mass index (kg/m²)	28.1 ± 3.1	27.2 ± 4.5	0.69
Pre-op Diagnosis			
1st treatment of Gammaknife(Months)	19.1 ± 6.1	17.9 ± 5.6	0.43
1st Marginal Dosage delivered to the nerve	76.4 ±5.2	78.1 ±5.4	0.51
Tobacco use	8	5	0.99†
Diabetes mellitus	6	9	0.61†
Carbamazepine Levels (mg/L)	6 ± 1.8	6.4± 1.6	0.36
Operative side (left/right)	28/31	32/30	0.78
ASA Physical Status Class (I/II/III)	14/37/8	15/38/9	0.59†

Values for continuous variables given as mean and standard deviation
*Continuous variables analyzed using Wilcoxon rank sum test. Categorical variables analyzed using Chi-square test, unless otherwise noted.
†Determined using Fisher's exact test.

Balloon Compression

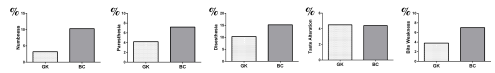


The balloon catheter was inflated by 0.7ml of radio-opaque contrast.The duration of compression was 60 secs.

Secondary Outcomes			
Questions	Treatment	Control	P value
Outcome Importance Rank† (12 weeks)			
Numbness	3.2 ± 0.5	10.3 ± 3.9	0.1
Paresthesia	4.2 ± 0.9	7.2 ± 0.6	0.49
Disesthesia	10.3 ± 3.1	15.2 ± 2.7	0.39
Taste Alteration	4.5 ± 0.6	4.4 ± 0.9	0.78
Bite weakness	3.8 ± 0.9	7.0 ± 0.9	0.13
Medication (No. of patients)			
None	23	25	0.19
Carbamazepine 200 mgs x 2 day	31	28	0.48
Carbamazepine 200 mgs x 3 day or more	5	9	0.13*
Overall			0.15*
Patient satisfaction (No. of patients)			
Excellent	26	29	0.46
Average	29	27	0.68
Unacceptable	4	6	0.49*
Overall			0.63*

The numbers are given as the mean and standard deviation when applicable. Data analyzed using Chi-square test, unless otherwise noted.
†Patients ranked each variable in order of importance, 1 (most important) through 5 (least important), using each number only once.
*Determined using Fisher's exact test.

GKRS Vs Balloon compression Side Effects



Common side effects Facial Numbness post op v2,v3 distribution (13.12%. vs. 64.23%; p=0.0192), and 3 months (17.29% vs. 24.68%; p=0.034).

Conclusions

- PRBC decreased acute primary trigeminal neuralgia. PRBC not provided a clinical advantage over GKRS in terms of decreasing carbamazepine dosage and long term pain control.
- A second GKRS resulted in showed satisfactory pain reduction with a low risk of complications.
- It is necessary to conduct prospective, randomized clinical trials to evalute long term effectiveness of PRBC and GKRS in refractarory trigeminal neuralgia.

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