Effectiveness of Gamma Knife Stereotactic Radiosurgery for Trigeminal Neuralgia without Apparent Responsible Vessels on MRI

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Objective:

Gamma Knife stereotactic radiosurgery (GKRS) has been reported to be a safe and effective treatment option for trigeminal neuralgia (TGN). Cease or decrease of pain may be achieved in eighty to ninety percent of patients. Effectiveness of GKRS was retrospectively investigated in a subgroup of patients with TGN without apparent responsible vessels, such as offending arteries, on MRI in this study.

Materials and methods:

No apparent responsible vessels causing TGN were detected in 17 cases, five males and 12 females, among 113 treated by GKRS for TGN in Ookuma Hospital from July, 2016 through June, 2024.
Follow up periods more than 12 months was obtained in 14 cases among 17. The mean age of 14 patients was 73.1 years. The mean period between occurring TGN and GKRS was 6.2 years. High-radiofrequency ganglion block had been done in one case before GKRS. A single dose of 70 to 80 Gy was delivered at the retrogasserian portion (RGP) or the root entry zone (REZ) of the ipsilateral trigeminal nerve using Gamma Knife.

Results:

Follow up periods more than 12 months was obtained in 14 cases among 17. Cease or decrease of TGN was achieved in all 14 cases at least temporarily. In five cases among 14 TGN recurred between 12 and 48 months. Repeat GKRS was performed in two cases and medication was added in one case. The recurred pain was disappeared or decreased again without additional procedures in two. After all, cease or decrease of pain was achieved in all 14 cases at the end of follow-up period, though only two patients was free from medication. Considering adverse effects, mild facial dysesthesia occurred in two cases since 12 and 18 months after GKRS. In addition, in one case mild dysesthesia occurred since six months after repeat GKRS.

Case No.	Target / Max.dose	3 mos.	6 mos.	12 mos.	18 mos.	24 mos.	30 mos.	36 mos.	42 mos.	48 mos.	54 mos.	60 mos.	66 mos.	72 mos.	78 mos.
1	RGP/80	6~8 /10	8~10	7~10	6~8 *	8 *	6~8 *	8 *	?	?	?	?	?	5 *	
2	RGP/80	2~4	4~8	8	6~8	4	4	4	2~4	?	?	?	2		
3	RGP/80	0~4	2	2~4	2	2~4	2~4	2~4	2	2	?	?	?	?	2
4	RGP/80	3~6	2~4	2~8	1~2	2~4									
5	RGP/80	0~4	0	0 *	0 *	?	?	?	?	?	?	?	?	0 *	
6	RGP/80	4	3~5	2~5	7~9	2	2	0	2	0 **	0 **				
7	RGP/80	3~4	0	0~4	2~4	0	0 **	?	?	?	?	0 **			
8	RGP/80	4	2	2	8	2	2	2	2	2					
9	RGP/80	2~4	3~5	2	2	2	2	2	2	8	-> 2nd GK				
-> 2nd GK	RGP 70	3~4	2~4	1~2	0~2	2									
10	REZ/70	6~8	4~8	0~2	0~2	0	0	1~2							
11	REZ/70	8~10	2~4	2~5	0										
12	REZ/70	0	6~8	2~4											
13	REZ/70	8	0~4	4	2~4	8	-> 2nd GK								
-> 2nd GK	RGP/70	2	2 *	4 *											
14	REZ/70	3~5	2	2	2										

unchanged
minor responce
partial responce
complete response

Remarks

* having mild facial dysesthesia
** pain free without mediation
Case 8 : Increased dose of carbamazepine & additional pregabalin medication was releaved the recurred pain.
Case 9 : Repeat GKRS at 48 months after 1st GK was effective.
Case 13: Repeat GKRS at 24 months after 1st GK was effective.

Conclusions:

GKRS was a safe and effective treatment for TGN without apparent responsible vessels on MRI.

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