

가

가 , , 가

* . * . * . * . * . * . † . † . †

_____ : 가

_____ : 1988 7 1998 8 20 6 MV 가
 . 20 4 (20%) , 16 (80%) , 51 (22 78
) . (parasagittal area) (sphenoid wing)가 8 (40%) 가
 . 1 가 11 , 2 가 2 , 3
 가 1 , 6 . 5.72 cm³ (0.7
 8 15.1 cm³) , 2 (secondary collimator) 2 cm (1 3 cm) .
 19.6 Gy (9 30 Gy) . 2.5 109 53 .
 _____ : 95% . 가
 5 (25%), 가 14 (70%), 가 가 가 1 (5%) .
 가 가 1 19 , 4
 10 (50%) . 1 (5%) , 가 .
 _____ : 가

: , 가 ,

3 5)

가

15% , 40 4, 6 16)

2)

가 가 가 가
 가 가 가
 가 1, 2)
 가 17)
 5 7 10% , 10 20
 22%가 , 가
 가 5 26 37%, 10 55 74%
 가
 9%

2000 11 11 2001 5 28

1988 7 1998 8 20

6 MV 가

51 (22 78) ,

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8 : 가
 가 4 (20%), 가 16 (80%) ,
 51 (22 78) . (parasagittal
 area) (sphenoid wing)가 8 (40%) 가 6 .
 (Table 1). (Hitchcock's stereotactic
 frame)

20 30°
 CT

가
 가 5 arc (25%) ,
 , 90 30%
 가 1 (Table 2).
 mm 10% 가 7, 8)
 3 cm (2.0 cm) , 9 30 Gy
 (40 100%) 1

가
 가
 5.72 cm³ (0.78 15.1 cm³) , 6 109
 (53) . 20
 6 (30%), (residual tumor)
 11 (55%),

Table 1. No. of Patients by the Distribution of Tumor Location

Tumor location	No. of patients
Parasagittal	4
Sphenoid wing	4
Tentorium	3
Falcotentorium	3
Tuberculum sellae	2
Cavernous sinus	1
Petrous apex	1
Petroclivus	1
Ventricular trigone	1
Total	20

가 3 (15%) . 14
 , 8 ,
 , 6
 가 ,
 6 (30%)
 .
 6 1
 ,
 CT/MRI
 ,
 가 95% (19/20) .
 가 5
 가 14 (70%)
 가 가 1 (5%)
 가 가 19
 ,
 가 .
 9 (45%)
 , 10 (50%)
 가 , 1 (5%)

Table 2. Change of Mass Size following SRS* by Image

Change of mass size	No. of patients (%)
Decreased	5 (25%)
Arrested growth	14 (70%)
Increased	1 (5%)
Total	20

* SRS : Stereotactic Radiosurgery

Table 3. Clinical Response following SRS*

Clinical response	No. of patients (%)
Improved	9 (45%)
Stable	10 (50%)
Worsening	1 (5%)
Total	20

* SRS : Stereotactic Radiosurgery

(Table 3).

Year	Author	Sample Size	Grade	Primary Treatment	Secondary Treatment	Local Control (%)	Survival (%)	Notes
1957	Simpson	5	(grade I)	54 Gy	CT, MRI	81%	89%	1), 2), 3), 4), 5), 6), 7)
1988	Taylor	10	18%	10	Engenhart	40	29.4%	8), 9), 10), 11)
1993	Valentino	72	30%	72	Chang	4cm (1-5 cm)	76.5%	12), 13), 14), 15), 16), 17), 18), 19), 20), 21), 22)
1994	Goldsmith	54 Gy	15	15	Dziuk	15	89%	23), 24), 25), 26), 27)
1996	Hudgin	2	3	3	3	3	3	28), 29), 30), 31), 32), 33), 34), 35), 36), 37), 38), 39), 40), 41), 42), 43), 44), 45), 46), 47), 48), 49), 50), 51), 52), 53), 54), 55), 56), 57), 58), 59), 60), 61), 62), 63), 64), 65), 66), 67), 68), 69), 70), 71), 72), 73), 74), 75), 76), 77), 78), 79), 80), 81), 82), 83), 84), 85), 86), 87), 88), 89), 90), 91), 92), 93), 94), 95), 96), 97), 98), 99), 100)

가

,

가

,

가

28)

,

가

가

29, 30)

,

가

가

가

20, 25)

,

5%

24, 31, 32)

가

1 (5%)

가

가

,

가

가

가

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Abstract

Treatment of Intracranial Meningioma with Linac Based Radiosurgery

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Purpose : To evaluate the role of linac based radiosurgery (RS) in the treatment of meningiomas, we retrospectively analyzed the results of clinical and follow up CT/MRI studies.

Methods and Materials : From the 1988 July to 1998 April, twenty patients of meningioma had been treated with 6 MV linear accelerator based radiosurgery. Of the 20 patients, four (20%) were male and 16 (80%) were female. Mean age was 51 years old (22-78 years old). Majority of intracranial location of tumor for RS were parasagittal and sphenoid wing area. RS was done for primary treatment in 6 (30%), postoperative residual lesions in 11 (55%) and regrowth after surgery in 3 (15%). Mean tumor volume was 5.72 cm³ (0.78-15.1 cm³) and secondary collimator size was 2.04 cm (1-3 cm). The periphery of tumor margin was prescribed with the mean dose of 19.6 Gy (9-30 Gy) which was 40-90% of the tumor center dose. The follow up duration ranged from 2.5 to 109 months (median 53 months). Annual CT/MRI scan was checked.

Results : By the follow up imaging studies, the tumor volume was reduced in 5 cases (25%), arrested growth in 14 cases (70%), and increased size in 1 case (5%). Among these responsive and stable 19 patients by imaging studies, there showed loss of contrast enhancement after CT/MRI in four patients. In clinical response, nine (45%) patients were considered improved condition, 10 (50%) patients were stable and one (5%) was worsened to be operated. This partly resulted in necrosis after surgery.

Conclusion : The overall control rate of meningiomas with linac based RS was 95% by both imaging follow-up and clinical evaluation. With this results, linac based RS is considered safe and effective treatment method for meningioma.

Key Words : Meningioma, Linear accelerator, Radiosurgery