

:

*, †
* . † . †

_____ :

_____ : 1971 1992 45
 . 17.2 2.2:1 가 14 ,
 (suprasellar) 가 12 12 가 10 ,
 가 7 , 가 28 1982 가
 . 41 59 Gy (48.5 Gy), 19.5 36 Gy (24 Gy)
 2 260 82 .
 _____ : 4 14, 65, 76, 170 ,
 2 . 5 10 95.3% 84.7% , 5 10
 97.6% 88.8% . 4 3 ,
 1 가 48 50 Gy . 28
 15 45 Gy 18
 24 Gy (6 19.5 Gy).
 _____ : 100%
 45 Gy , 19.5 Gy .

: ,

)

72 90%
1 6)

가

_____ 1971 1992 45
 1999 10 9 1999 11 22
 : ,
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 ac.kr

가 1982
 가 1977
 가 1982 20
 Gy 가
 7, 8)
 5 39 17.2 10 가
 68.9% 2.2:1 (Fig. 1).
 (suprasellar) 가 14, 12
 12 (

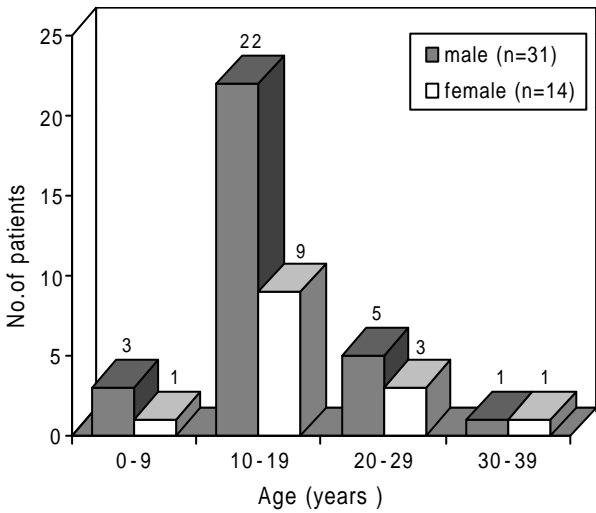


Fig. 1. Distribution of age and gender.

Table 1. Patients Characteristics by Location of Tumor and Gender

Site	No. of Patients		Total
	male	female	
pineal	13	1	14
suprasella	5	7	12
multiple	8	4	12
pituitary	0	2	2
other*	5	0	5

* thalamus 3, basal ganglia 2

Table 1).

4MV 가 Co-60
 1982 1982
 10, 7, 28
 7
 (7/10), 5 (5/7), 9 (9/28)
 (midplane) (isocenter),
 (anterior spinal canal)
 (prescribe)
 1.8 2 Gy 46
 57 Gy (50 Gy), 30 40 Gy (30.8 Gy)
 1.5 Gy
 41 59 Gy (45 Gy), 21 40.5 Gy (30 Gy),
 19.5 36 Gy (24 Gy)

Table 2

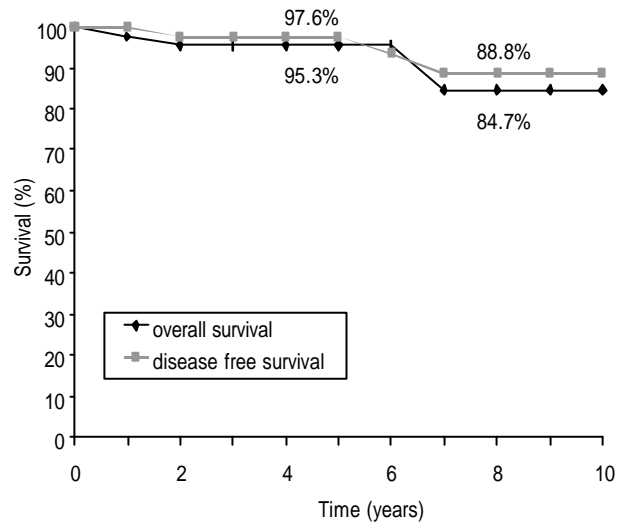


Fig. 2. Actuarial survival and disease free survival.

Table 2. Number of Patients by Treatment Volume and Primary Tumor Dose

Dose (Gy)	Volume		
	Local	W. Brain	CSI*
45	0	0	15
50	10	4	6
50<	0	3	7
Total	10	7	28

* craniospinal irradiation

Table 3. Data of 4 Patients Repeated Radiation Therapy

Case (No.)	Primary Site	RT [†] Volume	RT Dose (Gy)	Recurrence		Status (months)
				Site	Months	
1	pineal	local	50	frontal lobe	170	DWD [†] (183)
2	pineal	local	50	out of RT field [‡]	14	DWD (17)
3	pineal	local	48.5	frontal lobe	65	NED [§] (214)
4	thalamus	W.brain	48	primary & spine	76	DWD (83)

[†]radiation therapy, [‡] dead with disease, [‡] tentative geographic miss treated before CT era, [§] no evidence of disease

Kaplan-Meier

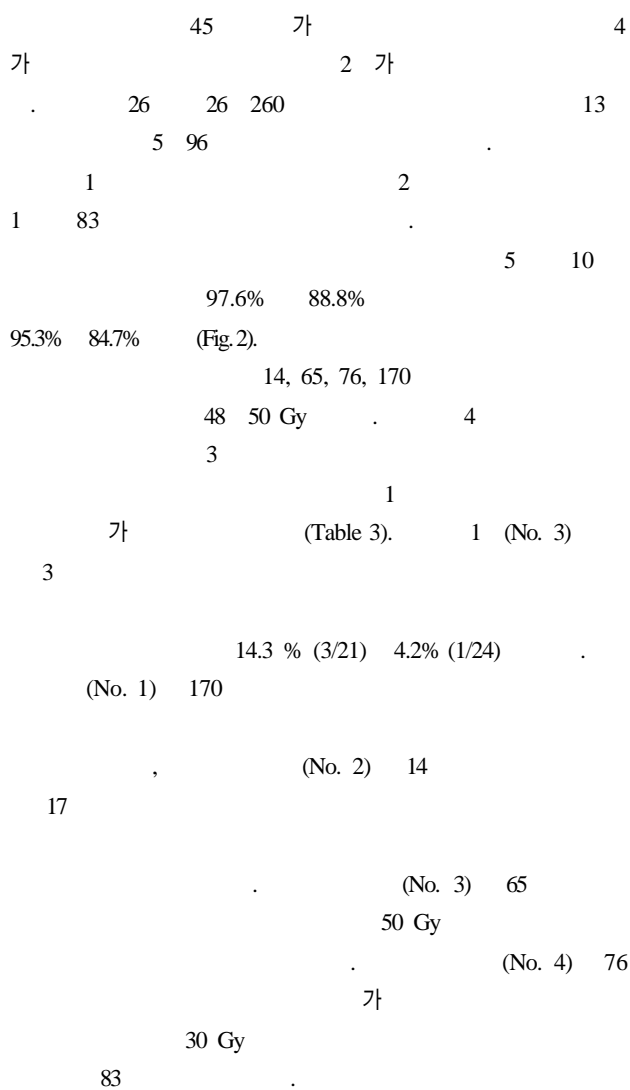


Table 4. Number of Failure Patients by Treatment Volume and Primary Tumor Site

Dose (Gy)	Volume		
	Local	W. Brain	CSI
45	0/ 0	0/0	0/15
50	[‡] 3/10	[†] 1/4	0/ 6
50<	0/ 0	0/3	0/ 7
Total	3/10	1/7	0/28

[‡]out of RT field recurrence, [†] primary & spinal seeding

Table 4 (3/10) (1/7) 28

15
41 45 Gy 18
19.5 24 Gy (6 19.5 Gy)

>50 Gy <50 Gy 9 12)

2 :

13 17) 50 Gy 가 33 Gy 가 29)
 (seminoma) (dysgerminoma) Hardenbergh
 , Linstadt
 17)
 24)
 1) Aydin 18)
 1 16 Gy 1 가 (primitive
 neuroectodermal tumor) Linstadt
 13)
 Fields 46 Gy 24)
 7 1 , Shibamoto 14) 0% (0/12) 23% (9/39)
 18.7 47 Gy 48 52.2 Gy , 54 62 15% 23% 가 .
 Gy 가 28 1
 45 Gy 15 1 0% 4 3
 4 48 50 Gy 3
 45 Gy 20 Gy
 1995
 40Gy, 19.5 Gy
 가 가
 10 30% 13, 19 22) 19, 30 33)
 (9.4%) Allen 19, 30)
 30 Gy, 20 21 Gy
 가 23) 11 1
 Buckner 32) 17 (9)
 15% 24) 51 16
 1 1
 가 17
 17, 18, 21, 23 25)
 Royal Marsden Hospital 26)
 2, 27, 28)
 0%
 가 가
 (neurocognitive) 가 가 100%
 17) 45 Gy , 19.5 Gy

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Abstract

Radiation Therapy of Intracranial Germinomas : Optimum Radiation Dose and Treatment Volume

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Purpose : To evaluate the possibility of decreasing the radiation dose and to determine optimum treatment volume in intracranial germinomas.

Materials and Methods : Forty five patients with pathologically-verified or presumed germinomas by a radiosensitivity test who had been treated with radiotherapy (RT) alone between 1971 and 1992 were retrospectively analyzed. The average age was 17.2 years with 68.9% of the patients being between the ages of 10 and 20. The male and female ratio was 2.2:1. The locations of the primary tumors were at the pineal regions in 14 patients; the suprasellar regions in 12 patients; and multiple sites in 12 patients. Treatment volumes varied from a small local field (10) to the whole brain (7) or entire neuroaxis irradiation(28). All the cases after 1982 received craniospinal irradiation (CSI). Radiation doses were 41-59 Gy (median 48.5 Gy) to the primary tumor site and 19.5-36 Gy (median 24 Gy) to the neuroaxis. The median follow-up period was 82 months with a range of 2-260 months.

Results : All the patients showed complete response after RT. Four patients suffered from recurrence 14, 65, 76, and 170 months after RT, respectively, and two patients died with intercurrent disease. One of four recurrent cases was salvaged by re-irradiation. Therefore, a 5 and 10 year overall survival was 95.3 % and 84.7 % respectively. Five and ten year disease-free survival was 97.6 % and 88.8 % respectively. All the recurrences occurred in the patients who received local RT (3/10) or whole brain RT (1/7) with a radiation dose of 48-50 Gy. None of the patients who received CSI suffered recurrence. There was no recurrence among the 15 patients who received 45 Gy to the primary site and the 18 patients who received 24 Gy (6 patients received 19.5 Gy) to the neuroaxis.

Conclusion : CSI is recommended for the treatment of intracranial germinomas. The radiation dose can be safely decreased to 45 Gy on a primary tumor site and 19.5 Gy on the spine.

Key Words : Intracranial germinomas, Radiation therapy