Effectiveness of Radiotherapy for Elderly Patients with Grade III Anaplastic Astrocytoma

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Introduction

Radiation is utilized routinely in the management of anaplastic astrocytoma (AA). However, the role of radiation therapy (RT) in the optimal management of elderly patients with Grade III, AA remains controversial. We used the SEER cancer registry to evaluate the effectiveness of RT in elderly AA patients.

Methods

Surveillance, Epidemiology, and End Results (SEER) registry was used to query a total of 489 patients over 70 years of age diagnosed with histology confirmed Grade III, AA between 1973 -2005. Overall survival was evaluated using the Kaplan-Meier method. Multivariate analysis was performed.

Table 1. Patient demographics and treatment for 450 grade III anaplastic tumor elderly (>70) patients according to the SEER database, 1973-2008.

	Tumor Type				
Variables	Astrocytoma (N=388)	Ependymoma (N=2)	Oligodendroglioma (N=58)	Ganglioglioma (N=2)	p value
Age at diagnosis					.32
mean (SD)	76.8 (4.5)	79.0 (9.9)	76.9 (4.9)	82.5 (4.9)	
median	76.0	79.0	76.0	82.5	
Gender					.66
male	193 (49.7)	1 (50.0)	34 (58.6)	1 (50.0)	
female	195 (50.3)	1 (50.0)	24 (41.4)	1 (50.0)	
Race, N (%)					.98
White	354 (91.2)	2 (100.0)	57 (98.3)	2 (100.0)	
Black	11 (2.8)	0 (0)	1 (1.7)	0 (0)	
Other	23 (6.0)	0 (0)	0 (0)	0 (0)	
Tumor size, N (%)					.07
≥ 4 mm	268 (85.9)	2 (100.0)	39 (95.1)	0 (0)	
< 4 mm	44 (14.1)	0 (0)	2 (4.9)	1 (100.0)	
Vital Status, N (%)					.09
alive	11 (2.8)	0 (0)	2 (3.5)	1 (50.0)	
deceased	377 (97.2)	2 (100.0)	56 (96.6)	1 (50.0)	
Radiotherapy, N (%)					.95
radiation	250 (64.4)	1 (50.0)	39 (67.2)	1 (50.0)	
no radiation	138 (35.6)	1 (50.0)	19 (32.8)	1 (50.0)	
Surgery, N (%)					<.0001
biopsy	203 (52.3)	0 (0)	24 (41.4)	0 (0)	
gross total resection	44 (11.3)	1 (50.0)	10 (17.2)	0 (0)	
partial resection	37 (9.5)	1 (50.0)	21 (36.2)	1 (50.0)	
surgery, NOS	104 (26.8)	0 (0)	3 (5.2)	1 (50.0)	
Treatment type, N (%)					.95
surgery only	138 (35.6)	1 (50.0)	19 (32.8)	1 (50.0)	
surgery + radiation	250 (64.4)	1 (50.0)	39 (67.2)	1 (50.0)	

Table 2. Survival rates for anaplastic astrocytoma (AA) and anaplastic oligodendroglioma (AO) patients according to the SEER database, 1973-2008.

	Tumor type		
	AA (N=388)	AO (N=58)	AA and AO (N=446)
Median Survival in months*	4 (3, 4)	7 (5, 10)	4 (4, 5)
Overall survival rate, % (95% CI)			
6 month	38.3 (33.4, 43.1)	62.1 (48.3, 73.1)	41.4 (36.8, 46.0)
12 month	19.3 (15.5, 23.4)	34.5 (22.6, 46.7)	21.3 (17.6, 25.2)
18 month	9.3 (6.6, 12.4)	21.8 (12.2, 33.2)	10.9 (8.2, 14.0)
24 month	5.2 (3.3, 7.8)	9.1 (3.4, 18.3)	5.7 (3.8, 8.2)
36 month	3.5 (2.0, 5.8)	7.3 (2.3, 16.0)	4.0 (2.4, 6.2)

*Log-rank p=.02; Wilcoxon p=.003 (survival difference between AA and AO)

Results

Among the 489 elderly patients with AA, 62% received radiation and 60% underwent surgical resection as part of their initial treatment. 38% of patients underwent surgery plus RT, 24% had RT only, 23% had surgery only and 15% had no treatment. Median survival for patients who underwent RT plus surgery was 6 months while patients who did not receive surgery or RT survived only 2 months. In comparison, the surgery only cohort had survival of 3 months and the RT only group had median survival of 4 months. Patients who received RT as part of their initial treatment had significantly longer survival than patients who did not receive RT (5 months vs. 3 months p<0.0001). Multivariate analysis showed that radiotherapy significantly improved overall survival (hazard ratio [HR 0.63], 95% confidence interval [CI: 0.52-0.76), p<.0001) after adjusting for extent of resection, age, and year of diagnosis. Patients over 70 years of age were less likely to receive RT than younger patients (62% vs. 80%, p<0.001).

Table 3. Univariate analysis of cancer-specific survival using Kaplan Meir estimates for cerebellar patients according to the SEER database, 1973-2008.

	Median survival in months					
	AA	p value	AO	p value	All AA	p value
Tumor size		.24		.66		.43
≥ 4 mm	4 (3, 4)		7 (3, 12)		4 (3, 5)	
< 4 mm	5 (3, 9)		8 (2, 14)		5 (3, 9)	
Radiotherapy		<.0001		.05		<.0001
radiation	5 (4, 6)		8 (6, 13)		6 (5, 7)	
no radiation	2 (2, 3)		3 (2, 6)		2 (2, 3)	
Extent of Surgery*		.008		.65		.001
high resection	6 (3, 10)		10 (3, 15)		7.5 (4, 11)	
low resection	4 (3, 4)		6 (5, 9)		4 (3, 5)	
Treatment type		<.0001		.05		<.0001
surgery only	2 (2, 3)		3 (2, 6)		2 (2, 3)	
surgery + radiation	5 (4, 6)		8 (6, 13)		6 (5, 7)	

* High-resection corresponds to gross total resection.
* Low-resection corresponds to either biopsy or partial resection.

Table 4. Multivariate analysis of cancer-specific survival using Cox proportional hazard model for 388 AA and 58 AO patients.

Characteristics	HR	95% CI	p value
Tumor type (ref: AO)			
AA	1.41	1.0, 1.97	.05
Gender (ref: male)			
female	0.75	0.60-0.93	.008
Race (ref: Caucasian)			
African American	0.98	0.48-1.98	.94
Other*	0.57	0.34-0.93	.03
Tumor size (ref: ≥ 4 mm)			
< 4 mm	0.70	0.51-0.96	.03
Radiotherapy (ref: no radiation)			
radiation	0.62	0.50-0.79	<.001
Extent of Surgery (ref: low resection)			
high resection	0.61	0.43-0.86	.005

* Other corresponds to Chinese, Japanese, and Filipino.
HR: Hazard Ratio, CI: Confidence Interval.

Learning Objectives

By the conclusion of this session participants should be able to:

1. Discuss the survival outcomes of elderly anaplastic astrocytoma patients.

2.Describe the effect of radiotherapy on outcomes of patients with anaplastic astrocytoma.

3. Describe the utilization of radiotherapy in the elderly AA patients as compared to younger AA patients.

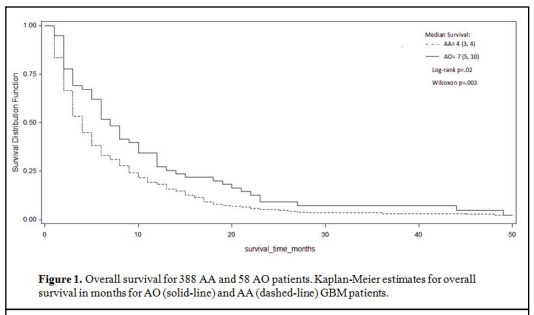

Figure 1. Overall survival for 388 AA and 58 AO patients. Kaplan-Meier estimates for overall survival in months for AO (solid-line) and AA (dashed-line) GBM patients.

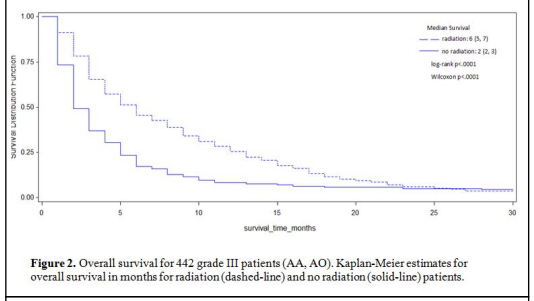

Figure 2. Overall survival for 442 grade III patients (AA, AO). Kaplan-Meier estimates for overall survival in months for radiation (dashed-line) and no radiation (solid-line) patients.

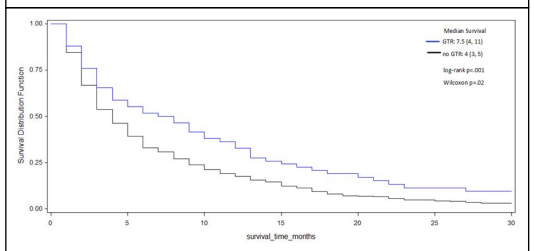

Figure 3. Overall survival for 442 grade III patients (AA, AO). Kaplan-Meier estimates for overall survival in months for patients that underwent GTR (blue) and no GTR (black).

Conclusions

Elderly patients with Anaplastic Astrocytoma who underwent RT as part of their initial treatment had better overall survival compared to patients who did not receive RT.

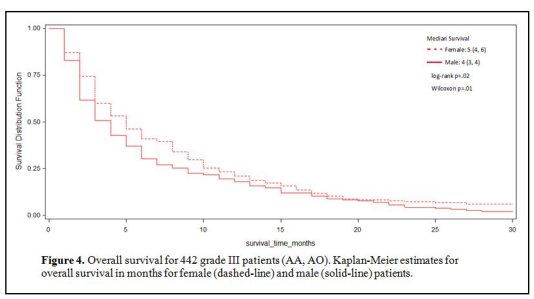

Figure 4. Overall survival for 442 grade III patients (AA, AO). Kaplan-Meier estimates for overall survival in months for female (dashed-line) and male (solid-line) patients.