



The Safety of Surgery in Elderly Patients with Primary and Recurrent Glioblastoma

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Introduction

While glioblastoma (GBM) is known to occur more frequently in elderly than in younger patients, older patients with GBM have generally been excluded from clinical trials studying the disease. As a result, poorly defined treatment practices may result in empiric conservative management in this age group. In particular, the safety of surgical resection for both primary and recurrent GBM is poorly understood in elderly patients.

Methods

We investigated adverse postoperative events in a retrospective cohort of patients age 65 years or older who underwent craniotomy for unilateral, unifocal, lobar GBM at our institution from 2000 to 2012. Additionally, we investigated adverse postoperative events following reoperation for recurrent disease. Events were reported according to the rigorous methods originally employed in the Glioma Outcomes Project.

Results

Patient Characteristics

We identified 243 elderly patients who underwent a total of 274 craniotomies.

- The reoperation group had a significantly lower cardiovascular risk compared with the single-surgery group, both at presentation (0.11 vs. 0.49, respectively; $p < 0.05$), and at recurrence (0.11 vs. 0.45, respectively; $p < 0.05$).
- Lower cardiovascular risk was associated with likelihood of reoperation on multivariate analysis ($p < 0.05$; OR 3.475 [1.095-11.025]). The groups were comparable with respect to age and KPS.

Surgery-Related Complications

The overall rate of complications following resection was 21.9%, with a rate of neurological complications of 7.7%. The rates of neurological, regional and systemic complications were not significantly different following initial craniotomy v. reoperation.

Predictors of Complications:

- Higher preoperative KPS was protective against overall complications on univariate analysis ($p = 0.030$; OR 0.741 [0.565-0.971]).
- Increasing age showed a trend toward being significantly associated with systemic complications on both, univariate ($p = 0.0594$; OR 1.09 [0.997-1.161]) and multivariate analysis ($p = 0.069$; OR 1.074 [0.994-1.160]).
- Increasing age was associated with regional complications on univariate analysis ($p = 0.014$; OR 1.142 [1.027-1.269]) and on multivariate analysis ($p = 0.017$; OR 1.14 [1.023-1.265]).

Surgery related morbidity and mortality in elderly patients.

N (%)	All Patients at First Resection (n=243)	Single-Surgery Group (n=215)	Reop Group at 1st resection (n=28)	Reoperations (n=31)	All craniotomies (n=274)
Overall	52 (21.4%)	47 (21.9%)	5 (17.9%)	8 (25.8%)	60 (21.9%)
Systemic	17 (7.0%)	15 (7.0%)	3 (10.7%)	3 (9.7%)	20 (7.3%)
DVT	6 (2.5%)	4 (1.9%)	2 (7.1%)	2 (6.5%)	8 (2.9%)
Pulmonary embolism	4 (1.6%)	3 (1.4%)	1 (3.6%)	1 (3.2%)	5 (1.8%)
Adverse drug reaction	3 (1.2%)	3 (1.4%)	0 (0.0%)	0 (0.0%)	3 (1.1%)
Systemic infection	4 (1.4%)	4 (1.2%)	0 (0.0%)	0 (0.0%)	4 (1.1%)
MI	1 (0.5%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	1 (0.4%)
Regional	20 (8.2%)	15 (7.0%)	2 (7.4%)	3 (9.7%)	23 (8.4%)
Intracranial bleeding	10 (4.1%)	9 (4.2%)	1 (3.6%)	1 (3.2%)	11 (4.0%)
Meningitis	2 (0.8%)	2 (0.9%)	0 (0.0%)	0 (0.0%)	2 (0.7%)
Hydrocephalus	7 (2.9%)	7 (3.3%)	0 (0.0%)	0 (0.0%)	7 (2.6%)
CSF leak	1 (0.4%)	1 (0.5%)	0 (0.0%)	0 (0.0%)	1 (0.4%)
Seizures	3 (1.2%)	2 (0.9%)	1 (3.6%)	1 (3.2%)	4 (1.1%)
Neurological	19 (7.8%)	16 (7.4%)	3 (10.7%)	2 (6.5%)	21 (7.7%)
New neurological deficits	19 (7.8%)	16 (7.4%)	3 (10.7%)	2 (6.5%)	21 (7.7%)

Comparison to Other Series

Our rate of complications was comparable to other series of non-elderly patients that the used the same reporting method.

Postoperative morbidity following surgical management of high-grade gliomas in large series utilizing strict reporting criteria.

Year	Authors	No. Patients	Median or mean age (years)	No. Reoperations	% of Patients				Mortality	
					Overall complications	Neurological complications	Regional complications	Systemic complications		
2003	Chang <i>et al.</i>	Resection 1	408	55	-	24.2	8.1	10.0	9.2	1.5
		Resection 2	91	50	91	32.6	18.0	13.0	8.7	2.2
2011	Gulati <i>et al.</i>	144	62	42	25.7	16.7	6.9	2.1	2.1	
2013	Tanaka <i>et al.</i>	53	74.3	0	18.9	11.3 (3.8)*	7.6	3.8	0.0	
2014	D'Amico <i>et al.</i>	Resection 1	243	73	-	21.9	6.5	8.4	7.3	1.5
		Resection 2	31	72	31	25.8	6.5	9.7	9.7	0.0

Conclusions

Complication rates are similar following initial craniotomy and reoperation in select elderly patients with GBM. Postoperative morbidity in elderly patients is comparable to rigorously reported rates in non-elderly patients undergoing craniotomy for primary or recurrent GBM. Age should not preclude aggressive surgical management of primary or recurrent GBM in select elderly patients.