

New Onset Seizure Following Brain Tumor Excision: A Risk Assessment Analysis

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Learning Objectives

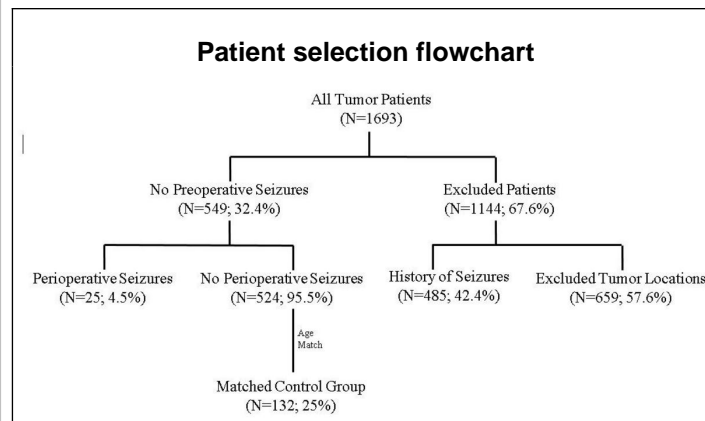
- Describe the incidence of new-onset perioperative seizures in seizure-naïve brain tumor patients
- Describe the characteristics placing seizure-naïve brain tumor patients at higher risk of perioperative seizures

Introduction

- Prophylactic use of antiepileptic drugs (AED) in the management of seizure-naïve brain tumor patients remains a topic of debate.
- The aim of this study was to identify and characterize a subset of patients at highest risk for new onset perioperative seizures who may benefit from prophylactic AED.

Methods

- Retrospective, case-controlled study
- 1693 adult brain tumor patients underwent resection or biopsy between 01/01/2004 to 06/31/2015
- All patients with a history of seizures prior to surgery were excluded
- Patients with posterior fossa tumors, pituitary tumors, and parasellar tumors were also excluded.
- The control group (group 2) was matched to seizure patients (group 1) according to age (± 0 years)
- For each patient, demographic data, clinical status, operative data, and postoperative course data were collected and analyzed



Results

- Of the 1693 patients, 549 (32.4%) never had a seizure prior to surgery.
- 25 (4.5%) seizure-naïve patients suffered from a perioperative seizure (group 1).
- A total of 524 (95.5%) patients who never suffered from a seizure event were matched to group 1 according to age (± 0 years), resulting in 132 control patients (group 2)
- There were no differences between treatment groups in terms of age, gender, race, relationship status, and neurological deficits on presentation.

Table 1. Population Characteristics

Characteristics	Group 1	Group 2	p-value
	N=25	N=132	
Median Age (range)	54 (15-77)	56 (14-77)	0.4660
Sex (% M)	60.0%	56.1%	0.7155
Race (% white)	88.0%	88.5%	1.0000
Relationship Status (% married)	56.5%	72.5%	0.1357
No. patients with focal motor, sensory, or speech deficit (%)	92.0%	84.1%	0.5359
Site of Tumor			
Right Hemisphere	36.0%	45.5%	0.3825
Left Hemisphere	60.0%	45.5%	0.1819
Frontal	64.0%	47.0%	0.1184
Temporal	32.0%	25.8%	0.5179
Parietal	20.0%	22.0%	0.8265
Occipital	4.0%	12.9%	0.3102
Intra-dural	84.0%	41.7%	0.0001
Extra-dural	20.0%	45.5%	0.0178
Seizure Prophylaxis (any agent)	95.7%	83.0%	0.2026
Intraoperative Cortical Stimulation	24.0%	9.2%	0.0445
Extent of Resection			
GTR	32.0%	64.9%	0.0021
STR or Biopsy	68.0%	35.1%	0.0021

STR: subtotal resection, GTR: gross total resection

Factors associated with the presence of perioperative seizures:

- Histological subtype (infiltrating gliomas vs. meningioma vs. other) ($p=0.04$),
- Intra-dural location ($p<0.001$)
- Intraoperative cortical stimulation ($p=0.044$)
- Extent of resection (less than gross total) ($p=0.002$)

Table 2. Perioperative seizure risk factors

Variable	OR	95% CI	p-value
Tumor Histology			0.04
Infiltrating Gliomas vs. Meningioma	3.57	1.08-15.24	0.031
Infiltrating Gliomas vs. Other	0.882	0.19-5.51	1.00
Intra-dural Tumors	7.35	2.28-30.74	<0.001
Extra-dural Tumors	0.300	0.084-0.895	0.018
STR or Biopsy vs. GTR	3.93	1.46-11.26	0.002
Intraoperative Cortical Stimulation	3.13	1.04-9.34	0.004

STR: subtotal resection, GTR: gross total resection

Conclusions

- Infiltrating gliomas, supratentorial intra-dural tumors and intraoperative cortical stimulation predisposed to perioperative seizures
- Gross total resection (GTR) was an important factor in reducing the risk of perioperative seizures

References

- Glantz MJ, Cole BF, Forsyth PA, et al. Practice parameter: anticonvulsant prophylaxis in patients with newly diagnosed brain tumors. Report of the Quality Standards Subcommittee of the American Academy of Neurology. *Neurology*. 2000; 54(10):1886-1893.
- Glantz MJ, Cole BF, Friedberg MH, et al. A randomized, blinded, placebo-controlled trial of divalproex sodium prophylaxis in adults with newly diagnosed brain tumors. *Neurology*. 1996; 46(4):985-991.
- Wu AS, Trinh VT, Suki D, et al. A prospective randomized trial of perioperative seizure prophylaxis in patients with intraparenchymal brain tumors. *J Neurosurg*. 2013; 118(4):873-883.