Spinal Cord Astrocytomas: A Modern 20-year Experience at a Single Institution

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Introduction

There are currently no clear treatment guidelines for the management of spinal cord astrocytomas. Additionally there is no conclusive evidence for the surgical resection of these tumors, with some studies even demonstrating worse survival with surgery. However, most have examined patients treated prior to the routine use of magnetic resonance imaging and advanced microsurgical techniques. In this study, the authors have examined the effect of resection on survival and neurological outcome in a modern cohort of patients with spinal cord astrocytomas.

Methods

A retrospective review was performed of patients with spinal cord astrocytomas treated at the Duke University Medical Center from 1992 to 2012. Univariate and multivariate analyses were utilized to identify variables associated with survival.

Results

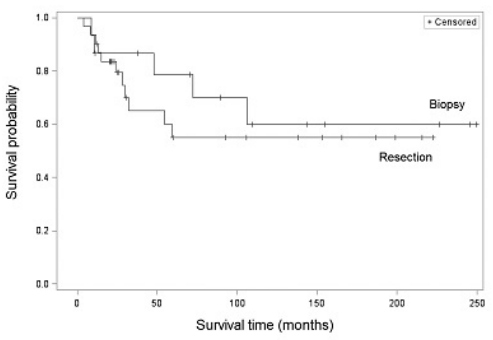
A total of 46 consecutive patients were identified and included in the analysis, most of whom had low grade tumors (63.0%). The majority of patients (67.4%) underwent surgical resection, with the remaining only receiving biopsy (Table 1). Of those who underwent resection, only 12.5% of patients underwent gross total resection, all of whom had low grade astrocytomas. Of all patients, 30.7% worsened compared to their preoperative baseline. The occurrence of worsening increased with high tumor grade (52.9% vs. 27.6%, p=0.086) and an increased extent of resection (66.7% vs. 18.8%, p=0.0069). Resection did not provide a survival benefit compared to biopsy alone (p=0.53) (Figure 1). Multivariate analysis revealed high grade histology (HR:11.3;95%CI:2.41-53.2;p=0.0021), tumor dissemination (HR:4.24;95%CI:1.22-14.8;p=0.023), and an increasing number of tumor involved levels (HR:1.31;95%CI:0.99-1.74;p=0.058) to be associated with worse survival.

Table 1. Treatment, and outcome characteristics of patients with spinal cord astrocytomas

Characteristics	All Patients (n = 46)	Low grade (n = 29)	High grade (n = 17)	P-value
Treatment				
Resection, %	67.4	62.1	76.5	0.31
Biopsy, %	32.6	37.9	23.5	0.31
Extent of resection				
Gross total, %	12.5	23.1	0.0	0.059
Subtotal and gross total, %	48.4	55.6	38.5	0.35
Partial, %	51.6	44.4	61.5	0.35
Radiation therapy, %	56.5	34.5	94.1	<0.0001
Chemotherapy, %	65.2	51.7	88.2	0.012
Outcome				
Postoperative MMS, median	2.0	2.0	3.0	0.0042
Change in MMS, mean	0.28	0.21	0.41	0.43
Neurological deficit, %	45.7	34.5	64.7	0.047
Neurological status				
Better	4.4	0.0	11.8	0.059
Same	58.7	35.3	72.4	0.014
Worse	37.0	27.6	52.9	0.086
Dissemination, %	23.9	10.3	47.1	0.0048
Time to dissemination	NR	NR	9.7	0.0009
Progression, %	65.2	55.2	82.4	0.062
Time to progression	19.8	75.9	6.0	0.0001
Dead at last follow-up, %	34.8	13.8	70.6	<0.0001
Median survival	25.8	77.0	12.1	0.0011

MMS: Modified McCormick Scale; NR: not reached

Figure 1: Kaplan-Meier overall survival curves demonstrating no survival benefit with surgical resection compared to biopsy alone



Conclusions

As surgical intervention is associated with a higher rate of neurological complications and lacks a clear benefit, the resection of spinal cord astrocytomas should be reserved for select cases and should be utilized sparingly.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of astrocytoma grade on the development of postoperative complications following resection, 2) Discuss, in small groups, the pros and cons of surgical resection for the treatment of spinal cord astrocytomas, 3) Identify an effective treatment strategy for spinal cord astrocytomas.