Need for Instrumented Spinal Fixation Subsequent to Resection of Intramedullary Spinal Cord Tumors in a Pediatric Population: A Single Institution Experience

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CONGRESS OF NEUROLOGICAL SURGEONS
2011 ANNUAL MEETING
WASHINGTON, DC
OCTOBER 1-6, 2011

Introduction

Intramedullary spinal cord tumors (IMSCTs) represent approximately 5% of all central nervous system neoplasms in pediatric populations. In addition to the challenges of achieving maximal resection of IMSCTs while preserving neurologic function, consideration must be given to the risk of progressive kyphotic deformity necessitating subsequent spinal instrumentation. A review of the literature suggests 5-61% of pediatric patients undergoing resection of IMSCTs require subsequent spinal instrumentation (1-5).

Methods

Following IRB approval, a retrospective chart review was conducted to identify all pediatric patients carrying a diagnosis of IMSCT, and operated upon by a single institution from 2003 to 2010. Analysis was undertaken to identify independent variables associated with the need for spinal instrumentation for progressive deformity following resection of IMSCTs.

Table 1

	No. Patients (%)	Mean (Median)	Range
Age (in years)		10.7 (11.4)	1.7 – 18.9
Gender			
Male	32(74)		
Female	11 (26)		
Pre-operative Spinal Deformity	11 (26)		
Pathology			
Pilocytic Astrocytoma	11 (26)		
Low-grade Astrocytoma	10 (23)		
Ganglioglioma	3 (7)		
Anaplastic Astrocytoma	3 (7)		
Glioblastoma/High-grade Glioma	4 (9)		
Neurocytoma	1 (2)		
Hemangioblastoma	2 (5)		
Gangliocytoma	2 (5)		
Ependymoma	3 (7)		
Myxopapillary Ependymoma	2 (5)		
Low-grade indeterminate	1 (2)		
High-grade indeterminate	1 (2)		

Patient Demographics and Histopathologic Diagnosis

Results

43 patients under 18 years of age (mean 10.7 years) underwent resection of IMSCT by a single surgeon at a single academic tertiary care center between 2003 and 2010 **(Table 1)**. Mean length of follow-up was 15.9 months. Seventeen patients (39.5%) had prior operations by outside surgeons. Five patients required instrumentation (11.6%), of which four had prior operations by an outside surgeon (80%). In comparison, one patient of twenty-six, whose first operation was with the single surgeon in this study, required subsequent instrumentation (3.85%). These findings were independent of patient age, pathologic diagnosis, segmental length of exposure (median 4 [non-instrumented] vs 6 [instrumented] levels), laminectomy (15.4%), laminoplasty (10%), or pre-existing spinal deformity (65.6 vs 34.4%). There was, however, a 6x higher incidence of instrumentation among patients undergoing previous surgery (RR 6.11); this was not statistically significant (95% CI 0.75-50.1) **(Table 2)**.

Conclusions

Although the results do not provide statistically significant predictors of the need for spinal instrumentation to address progressive kyphotic deformities following resection of IMSCTs, they indicate a trend towards greater preserved spinal stability in the hands of surgeons at high volume centers.

Table 2

	No. Patients (%)	Mean (Median)	Range
Prior Operation by Outside Surgeons	17 (39.5)		
No. Levels		5 (4)	1 – 9
Operative Technique			
Laminoplasty	30 (69.7)		
Laminectomy	13 (30.3)		
Instrumentation Required	5 (11.6)		
Laminoplasty	3 (10)		
Laminectomy	2 (15.4)		
Prior Operation by outside surgeon	4 (23.5)		
First Surgery at Study Institution	1 (3.85)		

Intraoperative Variables and Outcomes

Learning Objectives

At the conclusion of this session, participants should be able to: 1) Describe the risks of progressive spine deformity and spinal instrumentation following resection of IMSCTs, 2) Discuss the potential association between multiple operations and progressive spinal deformity in pediatric patients treated for IMSCT, 3) Discuss the potential benefits to creating centers of excellence which provide operative resection of IMSCTs at high volume centers.

References

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