



# Management of Spinal Deformity Following Surgical Resection of Pediatric Intramedullary Tumors

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## Introduction

- Surgical treatment of pediatric intramedullary tumors is complicated by development of secondary spinal deformity.
- Morbidity associated with development of secondary deformity affects long term survival and functional outcomes.
- Recommended treatment options include concurrent fusion, osteoplastic laminoplasty and external bracing.
- Various risk factors have been identified. However there is a lack of consensus in management.

## Methods

Case records for pediatric patients (<21yr), treated at our institution for IMSCTs were analyzed. Characteristics of baseline neurological state, clinical demographics and disease course were reviewed. Assessment of spinal instability was undertaken in consultation with the Orthopedics Service.

## Results

### Demographics

- Fifty five patients (male=30, female=25) were identified from 1975 to 2010.
- Mean age was 10yr (range: 0.5mo–20yr).
- Mean follow up period was 9.5yr (6mo - 36yr).
- Low-grade astrocytomas (n=24; 44%) were most prevalent followed by ependymomas (n=11, 20%), ganglogliomas (n=5, 9%) and anaplastic astrocytomas (n=7, 13%).

## Results

### Spinal Deformity

- Overall incidence of significant kyphoscoliosis was 27% (n=15).
- Of these, 6/15 (40%) had pre existing de novo or secondary (as a result of preceding surgery) kyphoscoliosis.
- Incidence of spinal fusion for patients with significant kyphoscoliosis was 60% (n=9/15), with an overall incidence of spinal fusion at 16% for our study population (n=9/55).

### Risk Factors for Development of Secondary Spinal Deformity

	Deformity group, n=15 N (%)	Remainder, n=40 N (%)	Significance p-value
Age (mean, yr)	6.1 ± 1.1	11.5 ± 1.1	0.004*
Laminoplasty vs. Laminectomy	1/15 (7)	12/40 (30)	0.03*
No of laminectomy levels, mean	6	4	0.01*
McCormick Grade at presentation	Grades I-III: 11 (73) Grades IV-V: 4 (27)	Grades I-III: 32 (80) Grades IV-V: 8 (20)	ns
Tumor grade	HG: 2 (13)	HG: 9 (22)	ns
Radiation therapy	9/15 (60)	18/40 (45)	ns

## Conclusions

- The development of spinal deformity in pediatric IMSCT patients is associated with high incidence of spinal fusion.
- Identification of risk factors enables detection and close monitoring of patients at risk for developing functional deterioration secondary to progressive deformity.
- Routine use of prophylactic fusion is not warranted.
- Osteoplastic laminoplasty may augment spinal stability and aid in averting spinal deformity.

## Learning Objectives

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

- 1) Describe the risk factors associated with development of spinal deformity in pediatric patients with intramedullary tumors;
- (2) Describe the management options for post operative spinal deformity.