Children with Presumed Early-Onset Idiopathic Scoliosis and Treated in Cast May Have Delayed Ambulation

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INTRODUCTION: Serial casting of patients with early-onset idiopathic scoliosis (EOIS) has been shown to be a safe, effective, and growth-preserving method for controlling spinal deformity and delaying surgical treatment. For young children with EOIS, casting sometimes begins before independent ambulation and a common parental concern is that casting may inhibit a child's ability to walk by a normal age. However, the effects of serial casting towards a child's ability to walk have not been previously described. Thus, the purpose of this study was to evaluate the influence of serial casting in EOIS on ambulatory age.

METHODS: This was a retrospective review from a multicenter database of EOIS patients from 2005-2021. Patients included those who had their first casts placed at less than 18 months old. Individuals who were already ambulatory at the first visit or had incomplete data were excluded. Data collected included patient sex, age at first visit, age at first cast application, total number of casts, pre- and post-cast major and minor Cobb angles, pre- and post-cast kyphosis angles, age at final cast removal, total time in cast, and age at first change in recorded ambulatory status. Patients were divided into three cohorts based on their first recorded change in ambulatory status: ≤18 months, 19-24 months, and >24 months. Differences between cohorts were analyzed via analysis of variance testing.

RESULTS: There were 203 patients from our initial search, of which 148 were pre-ambulatory at first visit, 44 were ambulatory at first visit, 1 was non-ambulatory, and 10 had unfilled charts. Of the 148 pre-ambulatory patients, 114 ultimately had complete data and included documentation in the change in ambulatory status. 30 had their first recorded change in ambulatory status at ≤18 months, 44 at 19-24 months, and 40 at >24 months. There were significant differences between the cohorts in terms of sex (p = 0.012), pre-cast major Cobb angle (p = 0.025), pre-cast minor Cobb angle (p = 0.011), age at cast removal (p = 0.011), and time in cast (p = 0.007) (Table 1). Ambulators at >24 months had larger pre-cast major Cobb angles compared to 19-24 months (47° vs. 36°, p = 0.019). Ambulators at >24 months also were older at age of cast removal (34 months vs. 23 months, p = 0.008) and had longer time in cast (22 months vs. 10 months, p = 0.007) versus ambulators at ≤18 months (Table 2). No statistical differences were noted between cohorts in terms of total number of casts, pre- and post-cast kyphosis angles, age at first cast application, post-cast major and minor Cobb angles, and age at first visit.

DISCUSSION AND CONCLUSION: The present study demonstrates a possible correlation between serial casting in EOIS and delayed independent ambulation. Those with delayed walking were more likely to be male, have greater magnitude initial Cobb angles, later age of cast removal, and longer time in the cast. While all patients in this study were presumed to be idiopathic, there could have been underlying factors and/or missed diagnoses related to the delayed ambulation that we were unable to analyze.

Table 1: Comparison of Cohorts by Age of Ambulatory Status

First change in recorded ambulatory status	≤18 months	19-24 months	>24 months	P-value
Number of Patients	30	44	40	0.255
Sex:				
Male	10	30	23	**0.012**
Female	20	14	17	
Total Number of Casts	5.9 (±2.8)	6.4 (±3.4)	7.5 (±4.2)	0.142
Pre-Cast Major Cobb Angle	42.0 (±17.3)	35.5 (±15.5)	47.3 (±14.8)	**0.025**
Pre-Cast Minor Cobb Angle	29.3 (±15.4)	18.6 (±8.4)	23.8 (±9.1)	**0.011**
Pre-Cast Kyphosis Angle	34.8 (±14.7)	33.3 (±14.1)	31.4 (±14.0)	0.849
Age at First Cast Application (months)	12.5 (±2.6)	12.4 (±3.3)	12.6 (±3.5)	0.947
Post-Cast Major Cobb Angle	34.3 (±21.8)	28.1 (±19.2)	40.1 (±21.3)	0.071
Post-Cast Minor Cobb Angle	21.2 (±11.4)	17.4 (±12.2)	22.2 (±10.5)	0.249
Post-Cast Kyphosis Angle	37.0 (±16.5)	44.3 (±17.2)	43.3 (±16.5)	0.799
Age at Final Cast Removal (months)	22.6 (±8.5)	26.0 (±13.3)	34.1 (±14.7)	**0.011**
Age at First Visit (months)	10.7 (±3.3)	10.4 (±3.8)	10.9 (±3.5)	0.824
Total Time in Cast (months)	9.9 (±8.7)	13.8 (±12.8)	21.6 (±12.9)	**0.007**

Table 2: Post-Hoc Testing of Significant Differences

Pre-Cast Major Cobb Angle	19-24 months vs. >24 months	**0.019**
Pre-Cast Minor Cobb Angle	≤18 months vs. 19-24 months	**0.019**
Age at Final Cast Removal (months)	≤18 months vs. >24 months	**0.008**
Total Time in Cast (months)	≤18 months vs. >24 months	**0.007**