

for C-spine injury from 2011-2014. The data set was broken down into 3 groups for analysis: patients evaluated under the original protocol, those under the 2012 protocol, and those under the 2014 protocol.

Introduction: The lack of standardized protocols, unreliable physical examinations, and difficulties in interpreting radiography often lead to further studies, such as CT. Safely and effectively clearing the pediatric C-spine presents difficulties as well.

Methods: During the study period, a total of 762 patients underwent C-spine clearance; 259 were evaluated under the original protocol, 360 under the 2012 protocol, and 143 under the 2014 protocol. The average age of all patients was 8.8 years, with 28% being younger than 5 years. During the entire study period from 2011-2014, no missed or delayed diagnoses of C-spine injury were identified based on review of institutional emergency room and outpatient records.

Results: CT scan use decreased from 90% under the original protocol, to 42% under the 2012 protocol, to 28.7% under the 2014 protocol. During the study there was an increase in time to C-collar removal from 8% removed at 13-24 hrs (original protocol) to 22% (2012) to 19% (2014). This was not associated with an increase in length of stay in the hospital.

Conclusions: Repeat, “next day” clinical examinations and increased involvement of the Spine Service decreased radiation exposure without compromising the diagnosis of C-spine injury or increasing length of stay at a Level One Pediatric Trauma Center in this pilot study.

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Paper #38

Effectiveness in Casting in Non-Idiopathic Scoliosis

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Summary: 31 non-idiopathic scoliosis patients completed casting series.

Hypothesis: In non-idiopathic pts, we anticipate casting will make a minimal impact on curve magnitude, but may buy valuable time in delaying surgical treatment.

Design: Prospective consecutive series retrospectively reviewed.

Introduction: Casting is an effective method used to delay or definitively treat IIS. However, the outcome of casting in syndromic and other non-idiopathic scoliosis is unknown. We wished to analyze the outcomes of casting in non-idiopathic scoliosis

Methods: An IRB approved review of a consecutive series of prospective EOS patients treated with casting at a single institution. Radiographic outcomes measured before cast and after cast series completion.

Results: 31 patients completed casting. Diagnoses were categorized as stiff syndromic scoliosis (N=13), eg. arthrogryposis; hyperlax syndromic (N=5), eg. Ullrich dystrophy; static encephalopathy (N=6); NF (N=2); and congenital scoliosis (N=5). The avg age at first cast was 4 (1-9.2),

casted for 11 mos (2.4-22.1) with 4.1 (2-9) casts. Pre-cast major curve was 64.8° (40-95) and thoracic height (T1-T12) was 14.4 cm (8.7-1.9); at the removal of the last cast, major curve was 59.4° (11-93) and thoracic height was 15.5 cm (11.6-21.9). 11 pts (35%) did not require further surgical intervention. Eight are currently being braced and 3 are under observation. The remaining 20 pts (65%) went on to operative treatments: operative group: spinal fusion (7), conventional growing rod (6), MAGEC rods (3), VEPTR (1), HGT with intent of surgery (2), and ant. tether (1). Compared to the op. group, nonop. was casted at a younger age (3.3 vs. 4.3), has more casts (4.5 vs. 3.9), but was in cast for a shorter time (9.8 vs. 11 months) (Table). Nonoperative had a smaller precast major curve (61 vs. 66.7) and significantly smaller curve after cast (43.9 vs. 68.3, $p < .001$). There was no difference in diagnoses between operative and nonoperative groups.

Conclusions: Casting in non-idiopathic scoliosis may achieve significant delay if the patient is treated at a younger age and obtains ~30% deformity correction. Older patients (> age 4) without obvious correction in cast can be expected to require surgical management and therefore casting is useful only as a delaying tactic.

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Paper #39

Growth of the Spine in Early Onset Idiopathic Scoliosis

Hong Zhang, Daniel Sucato



Summary: A consecutive series of infantile idiopathic scoliosis patients with a minimum 5 years follow up were retrospectively reviewed to study the pattern and velocity of spine growth. We found that the initial growth spurt of the spine in early onset idiopathic scoliosis is in the first three years of life. The growth velocity of the lumbar vertebra was greater than the middle thoracic which was greater than the upper thoracic vertebra during first 3 years of age.

Hypothesis: The pattern and velocity of spine growth in early onset scoliosis has not been known.

Design: A retrospective study measured the velocity of the spine from the infantile to later juvenile period in patients with infantile idiopathic scoliosis (IIS).

Introduction: The purpose of this study was to identify the growth pattern and velocity of the spine in early onset idiopathic scoliosis.

Methods: A consecutive series of IIS patients who had Mehta casting beginning <3 years of age and had radiographs measuring <10 degrees at a follow up of mean 6.3 years (5-7.4 years) from a single institution were studied. The PA full-length spine radiographs of each patient were used for measurement. The thoracic length, lumbar length, and each vertebral body height were measured. The parameters were categorized in three time periods: 0-3, 4-5, and 6-8 years old. Comparisons were made between the three periods to determine the growth spurt of the spine.

Results: There were 14 patients at an average age of 23.3 months at first casting, treated with an average of 4.8 casts over a 10.2 months period. The age of the final follow-up was average of 7.8 years old (6.5-9.2 years old). The growth rate of the thoracic and lumbar spine was greater in the 0-3 years (1.32 cm/year and 1.14 cm/year) compared to the 4-5 years (thoracic 0.81 cm/year and lumbar 0.59 cm/year) ($p < 0.05$) and 6-8 years (thoracic 0.70 cm/year and lumbar 0.54 cm/year). The mean growth rates in the upper thoracic and lumbar vertebral height in the 0-3 years were greater than the ones in the 6-8 years ($p < 0.05$), with no significant difference between 4-5 years and 6-8 years. The growth rate of the lumbar vertebral height was greater than the middle thoracic which was greater than the upper thoracic during the 0-3 years of age ($p < 0.0001$) (Table).

Conclusions: The initial growth spurt of the spine in IIS is in the first three years of life and is greatest in the lumbar spine. Initiating casting prior to 3 years of age will provide the greatest opportunity for success since rapid growth occurs in this time period.

Author disclosures: Hong Zhang: Globus Medical; People's Medical Publishing House. Daniel Sucato: Globus Medical.

	Non operative: branch/observe	Operative	All patients
	Mean/range	Mean/range	
N	10	20	30
First castage	3.3 (1-6.4)	4.3 (15-9.2)	4 (1-9.2)
Number of casts	4.5 (2-9)	3.9 (2-7)	4.1 (2-9)
Months incast	9.8 (4.7-17)	33 (2.4-22)	11 (2.4-22.1)
Pre-cast major curve	63 (95-85)	66.7 (90-95)	64.8 (90-95)
Pre-cast thoracic height (cm)	34.1 (10.9-18.9)	34.6 (8.7-18.9)	34.4 (8.7-18.9)
Post cast major curve (*)	43.9 (11-67)	68.3 (36-93)	59.9 (11-93)
Post cast thoracic height (cm)	35.9 (13-20.3)	35.2 (11.6-23.9)	35.5 (11.6-23.9)