



11th International
Congress on Early
Onset Scoliosis (ICEOS)

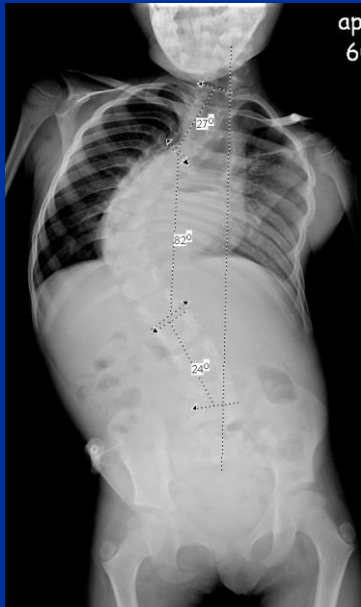
November 16 & 17, 2017
Hotel Del Coronado • San Diego, CA, USA

Casting in Early Onset Spinal Deformity When I Do and When I Don't

Suken A. Shah, MD

Division Chief, Spine & Scoliosis Center
Nemours/Alfred I. duPont Hospital for Children
Wilmington, Delaware USA
Associate Professor of Orthopaedic Surgery
Thomas Jefferson University

Nemours Alfred I. duPont
Hospital for Children

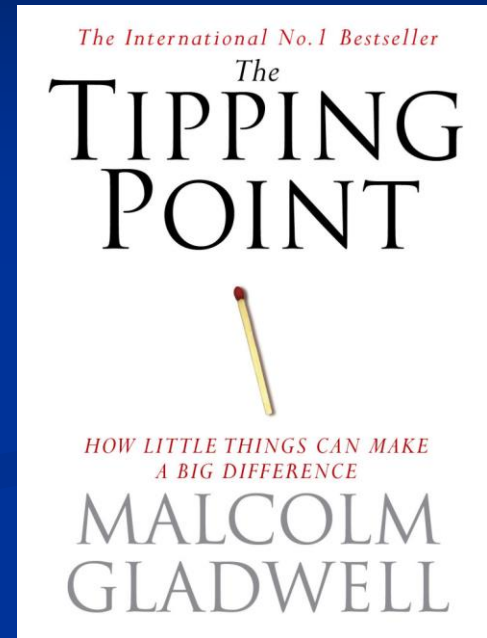


Goals of Treatment for EOS

- Control curve progression
- Optimize pulmonary function
- Maintain spinal growth, motion
- Limit complications
- Facilitate care of the patient
- *Improve quality of life*

Casting

- Re-emerging as treatment for EOS
- Why?
- Morbidity of early fusion
- Complications of TGR
- Search for something better
- Definitive treatment or delaying tactic?



Casting

- Cast is applied using the **elongation**, **derotation** and **flexion** technique described by Cotrel and Morel
- Anterior and posterior windows are made in the cast to allow abdominal/chest expansion and curve derotation as described by Mehta
- d'Astous and Sanders, *JPO* 2009

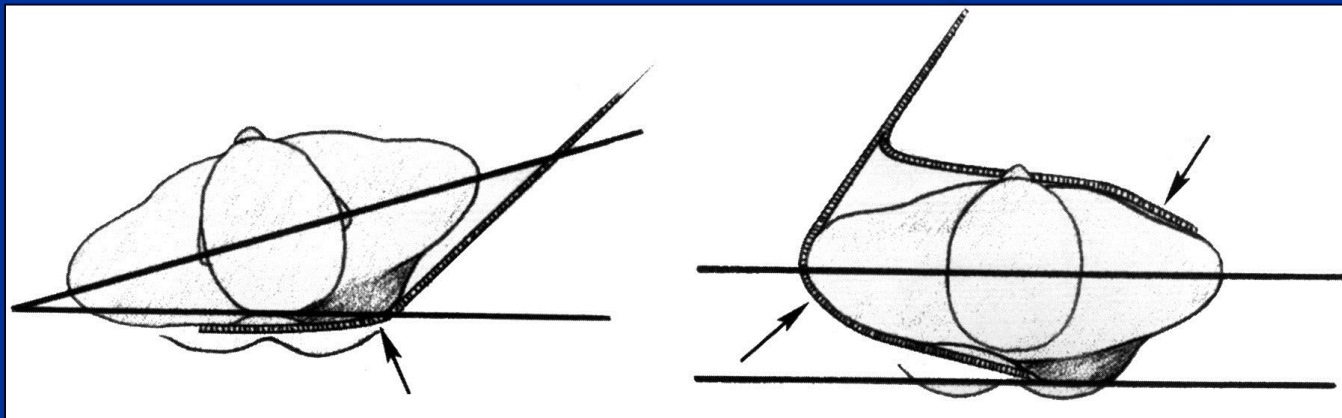
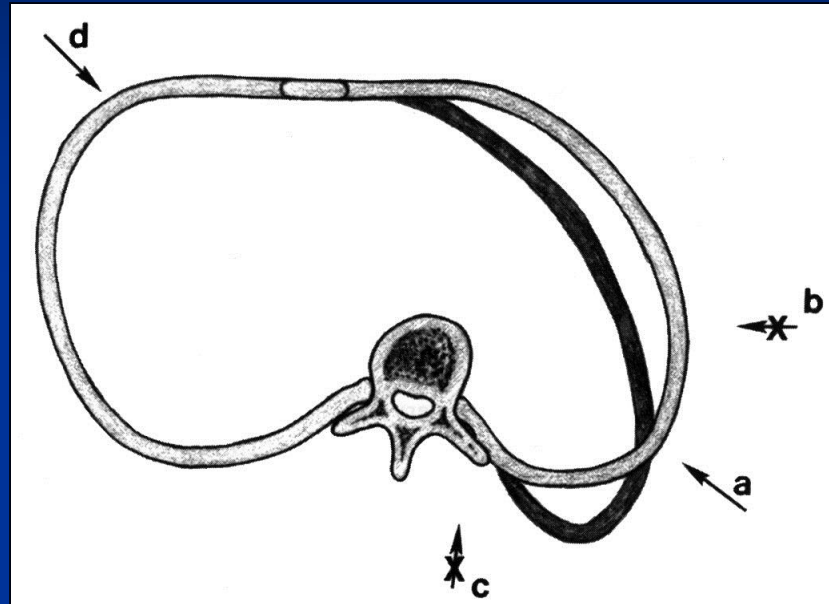


Growth as a corrective force in the early treatment of progressive infantile scoliosis

M. H. Mehta

*From the Royal
National
Orthopaedic
Hospital Trust,
Stanmore, England*

- Prospective study of 136 children with progressive IIS treated under 4 yrs, f/u 9 yrs.
- “Scoliosis can be reversed by harnessing the vigorous growth of the infant...by serial corrective casts.”
- 94 patients referred & treated early, scoliosis resolved with casting (avg age 1.6 yrs, Cobb 32°)
- 42 patients referred late, casting could reduce, not reverse the deformity (avg age 2.5 yrs, Cobb 52°)



Results of Casting

- Sanders J, D'Astous J, J Pediatr Orthop 2009
 - Best results in less than 20 mos, 60 degrees
- Baulesh DM, J Pediatr Orthop 2012
- Fletcher ND, J Pediatr Orthop 2012
 - Delay tactic, increased thoracic height
- Dhawale A, Shah SA, J Pediatr Orthop 2013
 - Increased PIP – anesthesia issue

New Data Suggests Benefit in Delaying Surgery

- Decrease in complications in older children
 - Better soft tissue
 - Larger implants
- Weight gains seen only in children > 4 years old
- Average length gains diminish over time
- Force to distract increases over time
- Complications vs. risks of delaying surgery

Who Do We cast?

- Idiopathic infantiles
- Sturdy phenotype, normal BMI
- Non syndromic
- Young (before 18-24 months)
- Flexible, long curves
- Low thoracic apex, TL junction
- Delay surgical intervention

Who Don't We Cast?

- Syndromic patients?
- Too old?
- Too stiff?
- Restrictive lung disease
- Skin sensitivity / allergies
- Thoracic / abdominal wall contraindications
- Deep venous thrombosis risk

Who Don't We Cast?

- Pectus carinatum / rib/sternal deformities
- Osteogenesis imperfecta
 - Chest wall deformation
- Metatropic dysplasia
 - Very stiff curves with restrictive lung disease
- Quadriplegic cerebral palsy
- Spinal muscle atrophy
- C spine contraindications
- Psychological issues

Complications

- Skin irritation / breakdown
- Muscle weakness / developmental delay +/-
- Joint pain / stiffness
- Sleep disruption (cast intolerance)
- Difficult ventilation during casting
 - Increase in PIP - Dhawale et al, JPO 2013
- Subclavian vein thrombosis

Psychosocial Effects of Repetitive Surgeries in Children with Early Onset Scoliosis

■ Methods

■ Instrument used

- Child Behavior Checklist (a parent-report instrument)
- Strength and Difficulties Questionnaire (a parent report behavioural screening questionnaire)
- Care Giver Support

- Abnormal psychosocial scores observed in patients with EOS. The at risk patients are younger at the time of their initial scoliosis surgery and the number of repetitive surgeries.

Evidence: Level III
(Matsumoto, Williams et al. 2013)

Issues with Repetitive Anesthesia

Anesthesiology 2010; 113:10-2

Copyright © 2010, the American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins

Anesthetic Effects on the Developing Nervous System

If You Aren't Concerned, You Haven't Been Paying Attention



ORIGINAL ARTICLE



Attention-Deficit/Hyperactivity Disorder After Early Exposure to Procedures Requiring General Anesthesia

Juraj Sprung, MD, PhD; Randall P. Flick, MD, MPH; Slavica K. Katusic, MD; Robert C. Colligan, PhD; William J. Barbaresi, MD; Katarina Bojanić, MD; Tasha L. Welch, MD; Michael D. Olson, PA-C; Andrew C. Hanson, BS; Darrell R. Schroeder, MS; Robert T. Wilder, MD, PhD; and David O. Warner, MD

“Children repeatedly exposed to procedures requiring general anesthesia before age 2 years are at increased risk for the later development of ADHD even after adjusting for comorbidities.”

Factors Associated with Response to Treatment

- Iorio et al, JPO 2017
- Idiopathic infantiles
 - BMI was predictive of curve improvement
 - Less than 1.8 years
 - Derotation to correct RVAD $< 20^\circ$

Congenital Scoliosis

- Cao et al, J Ortho Surg Res 2017
- Cohorts of congenitals vs non-congenitals
- Congenitals had
 - Larger curves at first cast and follow up
 - Lower correction rates
 - Lower thoracic growth rates
- Demirkiran et al, JPO 2014
- Reasonable treatment to delay surgery even in congenitals

Based on the current evidence, a trial of casting in EOS, regardless of curve etiology, should be considered a treatment option

Yang et al, Pediatrics 2016

Thorsness et al, JAAOS 2015

Canavase et al, WJO 2015

Thank You

Nemours Spine and Scoliosis Center
www.nemours.org/spinecenter



Nemours Alfred I. duPont
Hospital for Children