Casting doubt on the efficacy of bracing for early onset scoliosis

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Disclosures

- Li: see program
Early onset scoliosis (EOS)

- Potentially fatal if untreated
- Spine deformity → chest wall deformity → pulmonary restriction
Goals of treatment

- Control (or **CORRECT**) spine and chest wall deformity
- Optimize pulmonary function
- Maximize growth of spine
- Preserve spinal motion
- Low complication rate
Operative treatment

- Early fusion → increased rates of pulmonary compromise
- Infection
- Implant failure
- Spontaneous fusion
Nonoperative treatment

- Cast vs brace

- **No data on efficacy of bracing for EOS**
EDF casting

- Cotrel and Morel
- Elongation, Derotation, Flexion
- Improved fit
- Constant corrective force
- Can lead to curve resolution

• 136 children
  • 100 idiopathic

• **69% had full curve correction** by age 3.5 years

• 31% had partial curve correction

• Younger age, smaller curve associated with curve resolution
• 77% with full curve correction treated by age 2 years

• Casting should be initiated <2 years

• Younger age → faster time to curve resolution
55 children
37 idiopathic
89% had curve improvement
Better prognosis:
Age <20 months
Curve <60°
Idiopathic
• ≥1 year of casting to full curve correction

• Older children, larger curves, non-idiopathic still had curve improvement → delay in surgery
Serial Casting as a Delay Tactic in the Treatment of Moderate-to-Severe Early-onset Scoliosis

Nicholas D. Fletcher, MD,* Anna McClung, BSN, RN,† Karl E. Rathjen, MD,† Jaime R. Denning, MD,‡ Richard Browne, PhD,‡ and Charles E. Johnston III, MD†

• 29 children
  • Non-idiopathic
  • Age >2.5 years with idiopathic curve >50°

• Casting **maintained** the curve
  • 69° before first cast → 76° at last follow-up
• 52% eventually required surgery

• Surgery delayed 39 months from first cast

• 72% avoided growing spine surgery
The Role of Serial Casting in Early-onset Scoliosis (EOS)

David M. Baulesh, BA,* Jeannie Huh, MD,† Timothy Judkins, MD,*
Sumeet Garg, MD,*‡ Nancy H. Miller, MD,*‡ and Mark A. Erickson, MD*‡

• 36 children
  • 17 non-idiopathic

• Non-idiopathic patients did not maintain curve correction obtained with casting at final follow-up

• **Surgery delayed 2.1 years** from first cast
Serial Derotational Casting in Congenital Scoliosis as a Time-buying Strategy

Halil G. Demirkiran, MD,* Senol Bekmez, MD,+ Rustem Celilov, MD,* Mehmet Ayvaz, MD,* Ozgur Dede, MD,‡ and Muharrem Yazici, MD*  

- JPO 2015, 11 children
- J Ortho Surg Res 2017
- 23 children (8 congenital)

The therapeutic characteristics of serial casting on congenital scoliosis: a comparison with non-congenital cases from a single-center experience

Jun Cao, Xue-jun Zhang*, Ning Sun*, Lin Sun, Dong Guo, Xin-yu Qi, Yun-song Bai and Bao-sheng Sun

- All had curve improvement
- Non-idiopathic patients had less curve correction
- **Delay need for surgery** in non-idiopathic patients

Spine Deformity 2015  
74 children (33 non-idiopathic)

Serial Derotational Casting in Idiopathic and Non-Idiopathic Progressive Early-Onset Scoliosis

Yazeed M. Gussous, MBBSa, Sergey Tarima, PhD, Shi Zhao, MS, Safdar Khan, MD, Angela Caudill, MPT, Peter Sturm, MD, Kim W. Hammerberg, MD

- JPO 2015, 11 children
- J Ortho Surg Res 2017
- 23 children (8 congenital)
Complications

• Skin breakdown/irritation (usually minor)

• Dhawale et al, JPO 2013: difficulty with ventilation during cast application (usually temporary)
Casting for EOS

• Curve correction/resolution:
  • Age <2 years
  • Smaller curves (<50-60°)
  • Idiopathic

• Delay surgery:
  • Older patients
  • Larger curves
  • Non-idiopathic

• What about initial cast correction as a predictor of success?
• 68 children

• 37% with treatment success (curve <15° at final follow-up)

• Younger age, smaller curve, greater % curve correction in first cast
Bracing young children is difficult because of compliance and rapid rate of growth, whereas growth-friendly surgery in young children has high complication rates.\textsuperscript{4,5} Serial casts for EOS can correct or stop curve progression, preventing the need for surgical-intervention or delaying it until a child is older.\textsuperscript{10}
Survey to describe variability in early onset scoliosis cast practices

A. Grzywna
A. McClung
J. Sanders
P. Sturm
J. Karlin

M. Glotzbecker
Children’s Spine Study Group
Growing Spine Study Group

• Survey of CSSG/GSSG members
• 55/92 (60%) response rate
Survey to describe variability in early onset scoliosis cast practices

A. Grzywna¹
A. McClung²
J. Sanders³
P. Sturm⁴
J. Karlin⁵
M. Glotzbecker¹
Children’s Spine Study Group⁵
Growing Spine Study Group²

Level of Evidence V
Expert opinion

• EDF cast most common (76%)

• Idiopathic and syndromic

• Major curve angle most important parameter to start casting
  • Median 30° (20-70°)
Survey to describe variability in early onset scoliosis cast practices

A. Grzywna¹
A. McClung²
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Growing Spine Study Group²

Level of Evidence: V: Expert opinion

• Minimum age 10 months (3-24 months)

• Wide variability with how first in-cast/out-of-cast x-rays taken, cast over or under the arm, brace use after casting
Serial elongation-derotation-flexion casting for children with early-onset scoliosis

Federico Canavese, Antoine Samba, Alain Dimeglio, Mounira Mansour, Marie Rousset

“Bracing... efficacy remains unproven in EOS”
“Casting... may result in complete correction in some patients... plays an important role in delaying... surgery in most patients”