

# DISTRACTION – A Philosophical Debate

Colin Nnadi

Lead Clinician & Consultant Spine Surgeon

Spine Unit

Oxford University Hospitals UK

## Disclosures

- Nuvasive

# Dual Growing Rod Technique for the Treatment of Progressive Early-Onset Scoliosis

## A Multicenter Study

Behrooz A. Akbarnia, MD,\* David S. Marks, FRCS,† Oheneba Boachie-Adjei, MD,‡  
 Alistair G. Thompson, FRCS,† and Marc A. Asher, MD§

Dual Growing Rod Technique • Akbarnia et al S53

**Table 3. Results of 23 Patients With 2-yr Follow-up Treated With Primary Dual Growing Rods Without Fusion**

Reference	T1–S1 (cm)			T1–S1 Growth (cm)/yrt	Length of Instrumentation (cm)		Complications	
	Pre-Initial	Post-Initial	Follow-up		Post-Initial	Latest Follow-up	Complications* (during treatment period)	Unplanned Surgery? (no. of surgeries)
Non-final fusion patients								
6	22.40	27.20	31.80	0.80	17.00	22.40	1	No
8	20.80	27.00	28.40	0.25	22.20	24.50	2	No
9	27.40	29.50	33.10	0.68	23.00	27.20	3	No
10	22.70	24.30	31.50	1.35	21.70	27.00	None	No
11	17.00	23.30	25.70	0.44	17.50	21.20	6	Yes (2)
12	25.90	30.10	35.50	1.06	27.40	33.30	None	No
13	13.80	19.50	26.50	1.50	15.00	23.50	7	No
14	19.40	24.80	25.60	0.17	20.20	23.90	None	No
16	25.70	27.60	31.70	1.05	25.90	30.50	5	Yes (1)
17	19.50	31.50	34.20	0.93	25.50	28.30	None	No
18	29.70	33.00	41.00	2.59	30.00	34.50	5	No
20	24.40	27.80	30.50	1.05	21.70	25.20	None	No
21	22.20	23.50	26.10	1.16	22.30	24.60	None	No
22	19.80	26.70	27.00	0.13	19.70	21.60	None	No
23	20.00	24.70	28.00	1.65	22.50	24.60	2,6	Yes (4)
4	26.50	30.30	39.70	1.39	26.30	35.70	5,8	No



## ■ SPINE

# A six-year observational study of 31 children with early-onset scoliosis treated using magnetically controlled growing rods with a minimum follow-up of two years

T. Subramanian,  
A. Ahmad,  
D. M. Mardare,  
D. C. Kieser,  
D. Mayers,  
C. Nnadi

### Aims

Magnetically controlled growing rod (MCGR) systems use non-invasive spinal lengthening for the surgical treatment of early-onset scoliosis (EOS). The primary aim of this study was to evaluate the performance of these devices in the prevention of progression of the deformity. A secondary aim was to record the rate of complications.

Table II. Summary of growth at follow-up

Parameter	Preoperative	Postoperative	6 mths	12 mths	24 mths	Latest follow-up
<b>Weight (kg)</b>						
n	11	28	30	31	31	31
Mean (range)	20.3 (13.2 to 27.6)	25.4 (13.8 to 48.2)	25.8 (13.9 to 51.8)	27.8 (14.8 to 56.0)	31.2 (15.8 to 61.5)	36.4 (17.9 to 67.0)
Rate of change/year*						+3.33 (1.0 to 7.8)
Percentage change*						+44.58 (8.6 to 117.5)
<b>Sitting height (cm)</b>						
n	9	28	30	31	31	31
Mean (range)	71.9 (50.1 to 98.5)	64.1 (49.0 to 77.5)	64.3 (53.0 to 76.0)	66.3 (52.7 to 82.0)	70.5 (52.7 to 99.1)	70.1 (58.5 to 83.0)
Rate of change/year*						+1.73 (-1.0 to 4.0)
Percentage change*						+9.97 (-3.6 to 22.6)
<b>Standing height (cm)</b>						
n	11	28	30	31	31	31
Mean (range)	113.0 (86.8 to 135.4)	120.2 (86.6 to 149.8)	120.6 (90.4 to 151.5)	124.0 (90.8 to 153.5)	129.1 (95.8 to 155.0)	137.4 (113.5 to 160.0)
Rate of change/year*						+4.81 (0.8 to 7.7)
Percentage change*						+15.12 (1.9 to 31.2)

\*Change from immediate postoperative values to values at the latest follow-up

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## COMMENTARY & PERSPECTIVE

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### **Guiding Growth Is Promising But Can It Compare with Growth Promotion?**

*Commentary on an article by Richard E. McCarthy, MD, and Frances L. McCullough, MNSc: "Shilla Growth Guidance for Early-Onset Scoliosis. Results After a Minimum of Five Years of Follow-up"*

Daniel J. Sucato, MD

Spine

DEFORMITY

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## Targeted Distraction

*Spinal Growth in Children With Early-Onset Scoliosis Treated With a Tail-gating Technique for Magnetically Controlled Growing Rods*

Mihai Mardare, MD, MSc,\* David Christopher Kieser, MBChB, PhD, FRACS, FNZOA,†

Adil Ahmad, MBBS, MRCS, BSc,\* Thejasvi Subramanian, MBBS,\*

Shahnawaz Haleem, MBBS, MSc, MRCSed, MRCSI, FRCS (Tr&Orth),\*

Chrishan Thakar, BSc, MBBS, MRCS, MSc, FRCS (Tr&Orth),\*

James Wilson-MacDonald, MBBS, FRCS (Tr&Orth),\* and Colin Nnadi, MBBS, FRCSI, FRCS(Orth)\*

## Management Themes in Early Onset Scoliosis

By Behrooz A. Akbarnia, MD

### Orthopaedic Advances

## “Growth Friendly” Spine Surgery: Management Options for the Young Child With Scoliosis

Jaime A. Gomez, MD  
Joseph K. Lee, MD  
Paul D. Kim, MD  
David P. Roye, MD  
Michael G. Vitale, MD

### Abstract

The natural history of early onset scoliosis is dismal and associated with poor pulmonary function and increased mortality. Although limited in situ fusion may be appropriate for certain types of congenital scoliosis deformities, spinal deformity that affects young children often requires a “growth friendly” surgical approach that allows for curve control while maintaining growth of the spine and thorax. Growth-friendly surgical management of early onset scoliosis can follow a distraction-based (ie, growth rods, vertical expandable prosthetic titanium rib [Synthes, West Chester, PA]), guided-growth (ie, Luque trolley technique, Shilla technique), or compression-based (ie, tethers, staples) strategy.

## Preoperative Medical and Surgical Planning for Early Onset Scoliosis

Charles E. Johnston, MD

### ■ Key Points

- Children with EOS may have significant contributory comorbidities, including pulmonary, cardiac, neurologic, gastrointestinal, and metabolic/nutritional conditions which must be addressed to permit safe and effective treatment of the spine/chest wall deformity.
- Objective criteria for instituting active corrective treatment include demonstration of deformity progression; failure of thoracic spine and/or thoracic circumferential growth; failure of thoracic volume growth; failure to gain weight or thrive.
- Many options exist for spinal or chest wall constructs and procedures, with their implementation dictated by length of deformity (local or long segment), age of patient, diagnosis, and potential for morbidity and complications of each procedure.



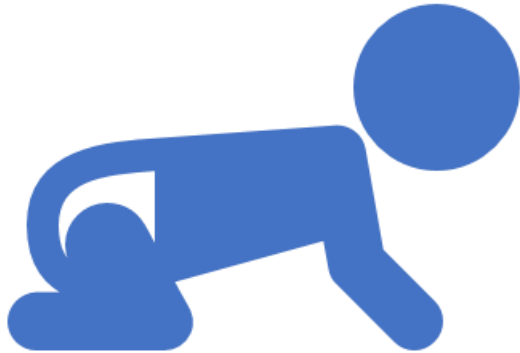
What is Growth Guidance?

# What is growth Guidance?

NICE guideline  
Published: 27 September  
2017  
([nice.org.uk/guidance/ng75](https://www.nice.org.uk/guidance/ng75))

Faltering growth:  
recognition and  
management of faltering  
growth in children





- A child's growth and development can be divided into four periods:
- Infancy
- Preschool years
- Middle childhood years
- Adolescence



- Physical development is divided into two areas
- Growth and development.
- Growth is the physical changes of, the increase in size, height and weight.
- Development is how children gain control over their physical actions to do complicated and difficult activities more skilfully and easily.
- Growth and development are linked because the development and improvement of physical skills depends on the size of the child and their muscular strength.
- Physical development will usually follow a sequence even though the age may vary.
- There are factors that can affect this sequence, such as a disability.



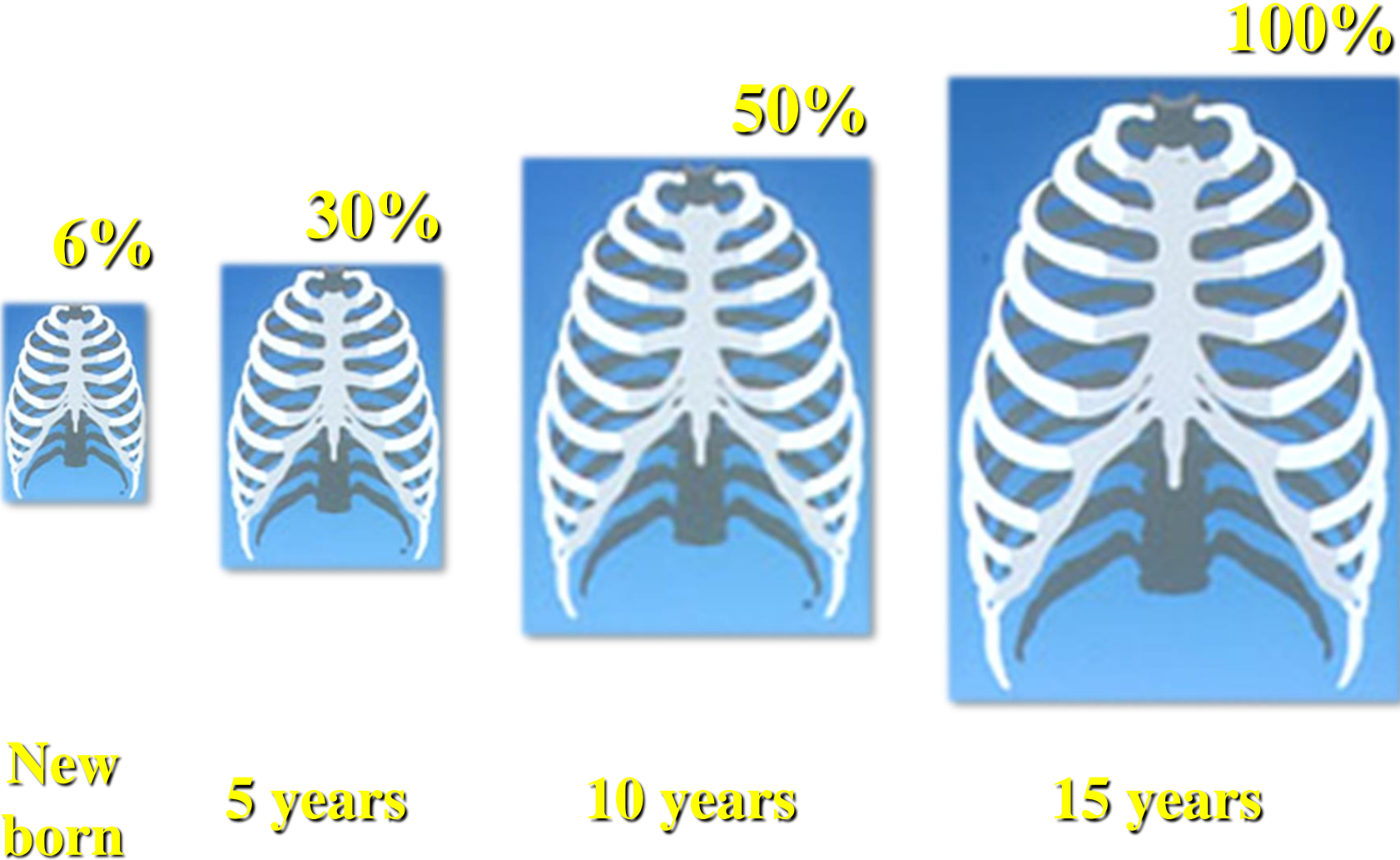
Infantile scoliosis, 16 Years  
Deficit on the sitting height 25 cm  
Weight 22 kgs  
Normal Length of the lower limbs



Courtesy of Alain Dimeglio

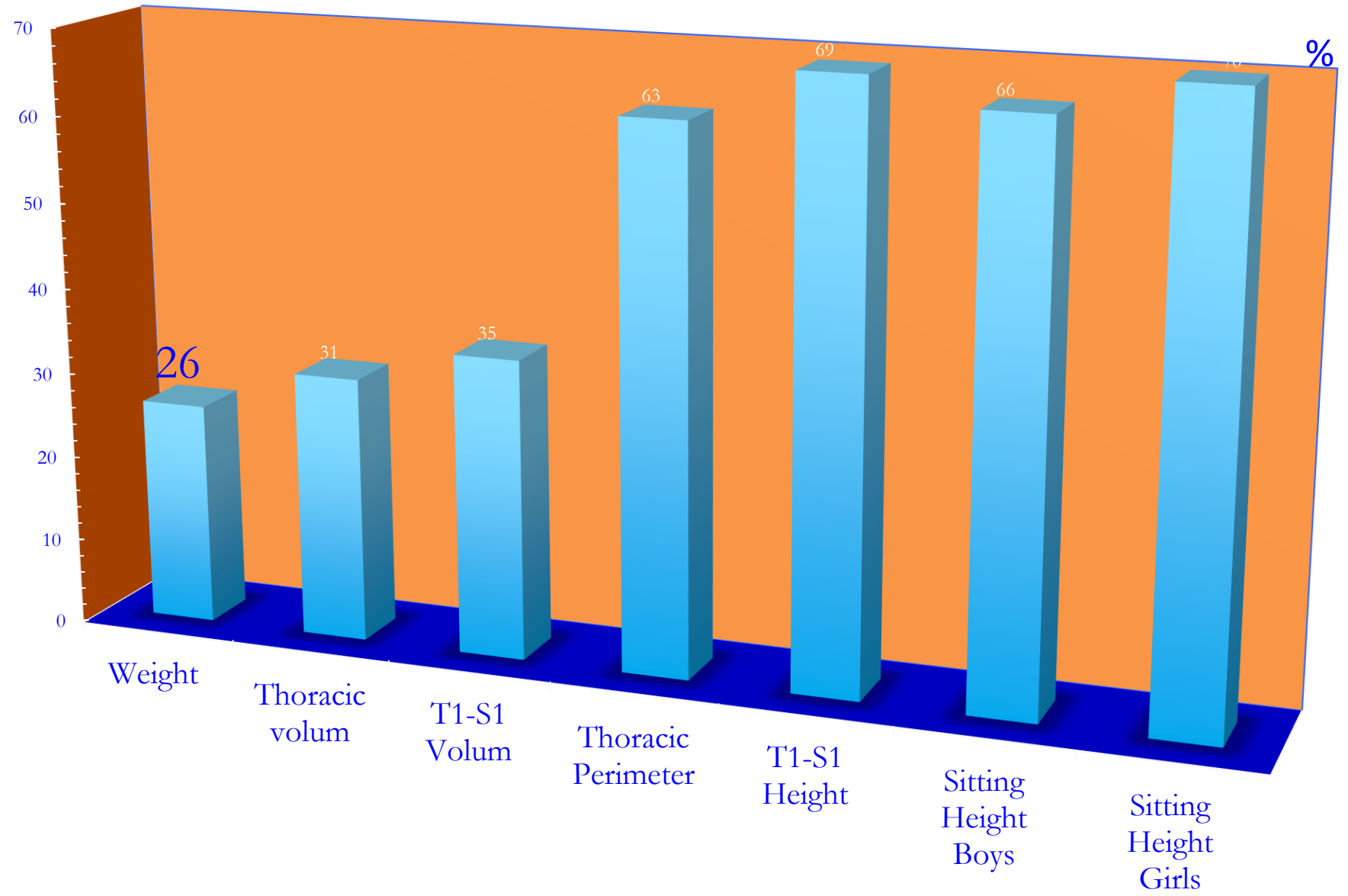
# VOLUMETRIC GROWTH

The thorax: the fourth dimension of the spine



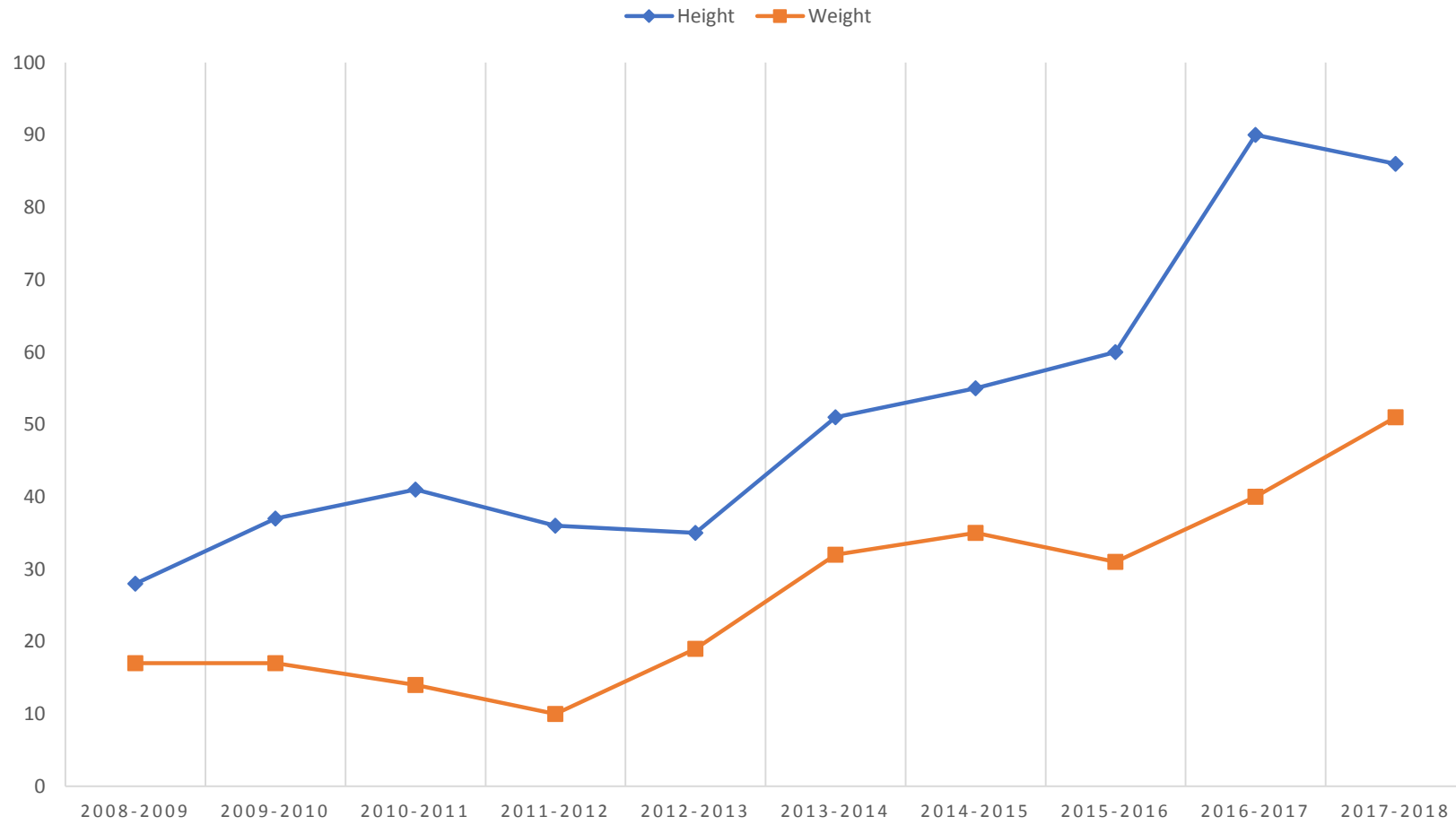
*The growing spine, Springer Velarg 1990*

# 5 years



# LITERATURE SEARCH

## GROWTH PARAMETER REFS IN LIT OVER LAST 10YRS



# Much of the same?

- Goals similar – Weight gain/Height gain/Spinal length/Lung development/Psychosocial development
- Why do we refer to one method as distraction based and another as Growth Guidance?
- Aren't they doing the same thing?

- Are we talking Spinal Growth or overall Growth Guidance?

- ?Distraction based ?Growth Guidance



# Skaggs Growth Friendly Treatment Classification

- **Nonoperative**

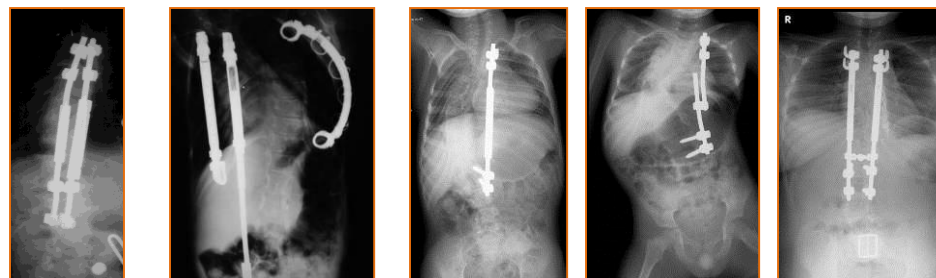
- Observation
- Bracing
- Casting



- **Operative**

- **Distraction Based**

- Single or Dual rod (Internal drive or MCGR)
- VEPTR
- Hybrid VEPTR-”knock-offs”



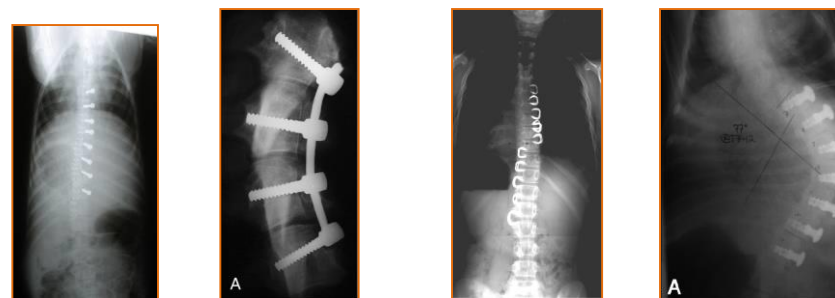
- **Growth Guidance**

- Luque trolley
- Shilla



- **Compression Based**

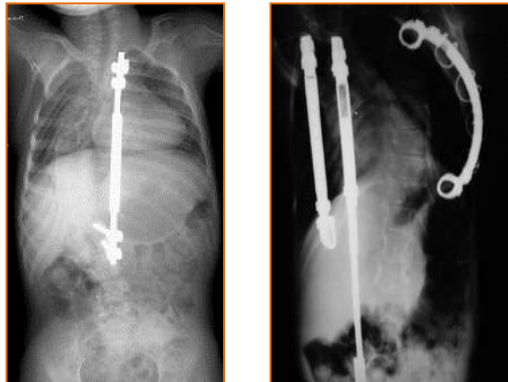
- Staples
- Screws/Tethers



# Growth Guidance

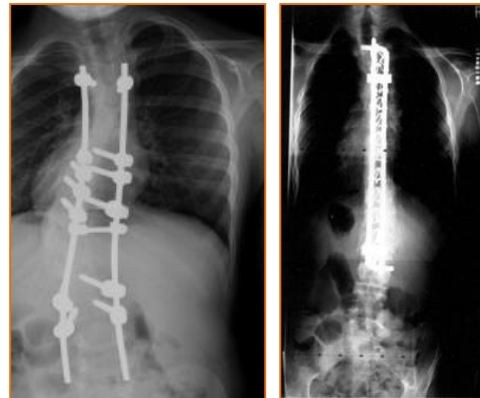
## *Active*

- TGR
- MCGR
- VEPTR



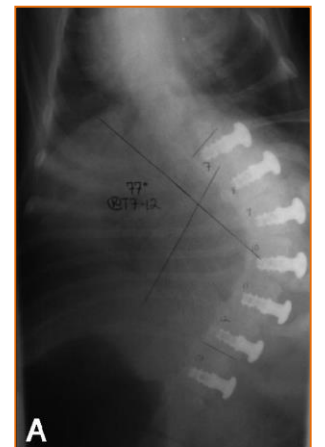
## *Passive*

- Observation
- Bracing
- Casting
- Luque Trolley
- Shilla



## *Differential*

- VBT
- Staples
- Convex Epiphysiodesis





There is a tide in the affairs of men, which taken at the flood, leads onto fortune.  
Omitted, all the voyage of their life is bound in shallows and in miseries

On such a full sea are we now afloat

And we must take the current when it serves, or lose our ventures

William Shakespeare