Does the “Law of Diminishing Returns” apply to guided growth Shilla constructs?

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Background

Distraction Based Growing Rods:
Law of Diminishing Returns

T1-S1 Gain (mm)

# of Lengthenings
Background

• Prior comparison of Shilla to Growing Rods showed greater increase in T1-S1 length in Growing Rod patients

• No study has examined whether the “law of diminishing returns” occurs in Shilla patients
Study purpose

To determine if the “law of diminishing returns” also occurs in guided growth Shilla constructs
Materials and Methods

Multicenter retrospective review

Inclusion criteria:
• Diagnosis of early onset scoliosis
• Guided growth Shilla construct
• Minimum two year follow up

Exclusion criteria:
• Prior instrumentation
• Index procedure > 10 yo
Materials and Methods

• T1-S1 length was measured on upright radiographs preoperatively, postoperatively and at annual intervals

• Nonparametric analysis of variance and linear regression performed
Results

- 33 patients met inclusion criteria
- Mean age at index instrumentation was 6.0 years (range 2.0 to 9.9)
- Mean follow up was 4.8 years (range 2 to 8)
Results

• Mean gain of 4.7 cm in T1-S1 length on postoperative radiographs from preoperative values

• At 1 yr, 73% (24/33) showed a **decrease** in T1-S1 length from postoperative values

• Mean T1-S1 length at 1 year was **1.4 cm less** than postoperatively
Results

Change in T1-S1 Length in mm

- Pre to Postop
- postop-1yr

KEEP CALM AND SETTLE DOWN
Results

Change in T1-S1 Length in mm

-20  -15  -10  -5  0  5  10  15

Postop-1yr  1-2yr  2-3yr  3-4yr  4-5yr  5-6yr  6-7yr
Results

• Increase in T1-S1 length was statistically significant for years 2 through 5 (p=0.003, p=0.02, p=0.006, p=0.005)

• Similar increase was observed in years 6 through 8 but was limited by the small number of pts
Change in T1-S1 between year 1 (a decrease) and year 2 was significantly different (p=0.0003)
NO significant difference in the change in T1-S1 overtime for subsequent years (p=0.21, 0.79, 0.78, 0.31, 0.91, 0.27)
Discussion

Study Limitations

• majority of patients have not reached skeletal maturity or had a definitive fusion

• Retrospective

• Multicenter study

• Small number of patients
Conclusion

• With mean follow up of 5 years, annual increases in T1-S1 length were sustained

• The “law of diminishing returns” does not appear to affect Shilla constructs in the same manner

• Longer term follow up is needed to determine if this is truly a “law of continuing returns”