Growing Rods for Spinal Deformity: Examining Principles and Practice

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Purpose

- To determine areas of consensus and *variation in principles* among surgeons who perform Growing Rod (GR) surgery through surveys

- To characterize the *current use* of GR surgery through analysis of multi-center database of Early Onset Scoliosis (EOS) patients with GR

Methods

- 2 surveys distributed to scoliosis surgeons:
  - Survey #1 - Surgeons' GR practice principles
    - *19 of 19 responded*
  - Survey #2 - Recommendations for specific cases of EOS
    - *17 of 40 responded*
- Survey results compared to 323 EOS patients in the Growing Spine Study Group (GSSG) database to examine whether *practice coincided with principles*

Results

Practice Principles Survey

	Principles Survey (19 surgeons)	GSSG Database (323 patients)
Pre-op Curve Size	Most commonly (79%) selected indication for GR → 73% agreed minimal curve = 50-60° → Other surgical indications included: - Curve rigidity - 9/19 (47%) respondents - Brace intolerance - 8/19 (42% respondents	73 ± 20° 87% of patients had curves > 50°

Results

Practice Principles Survey

	Principles Survey (19 surgeons)	GSSG Database (323 patients)
Pre-op Skeletal Age	95% agreed maximum age at GR insertion 8-10 years →	94% of patients < 10 years at GR insertion (Average age: 6.1 ± 2.5 years)

Results

Practice Principles Survey

	Principles Survey (19 surgeons)	GSSG Database (323 patients)
Contraindications for GR Surgery	26% - None 21% - Myelo 16% - Severe kyphosis 11% - Chest wall def.	All dx were represented

Results

Practice Principles Survey

	Principles Survey (19 surgeons)	GSSG Database (323 patients)
Lengthening Interval	74% agreed every 6 months	Average: 8.6 ± 5.1 months

Note: 26% of surgeons, or 5 of 19, experienced resistance from families to perform lengthening procedures

Results

Practice Principles Survey

	Principles Survey (17 surgeons)	GSSG Database (78 patients)
Indication for Final Fusion	77% Skeletal maturity (55% surgeons = Risser 4) 82% Complications: infxn or implant failure 47% Curve progressing >90° 41% Failure to distract	Mean age at final fusion: 12.1 ± 1.8 years

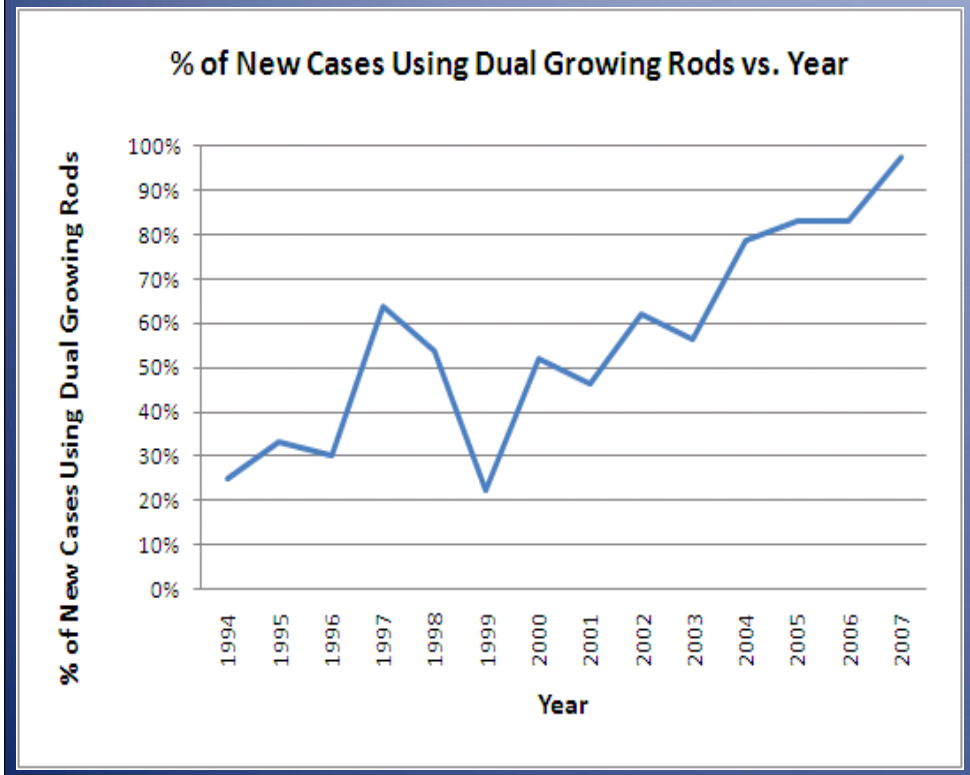
Results

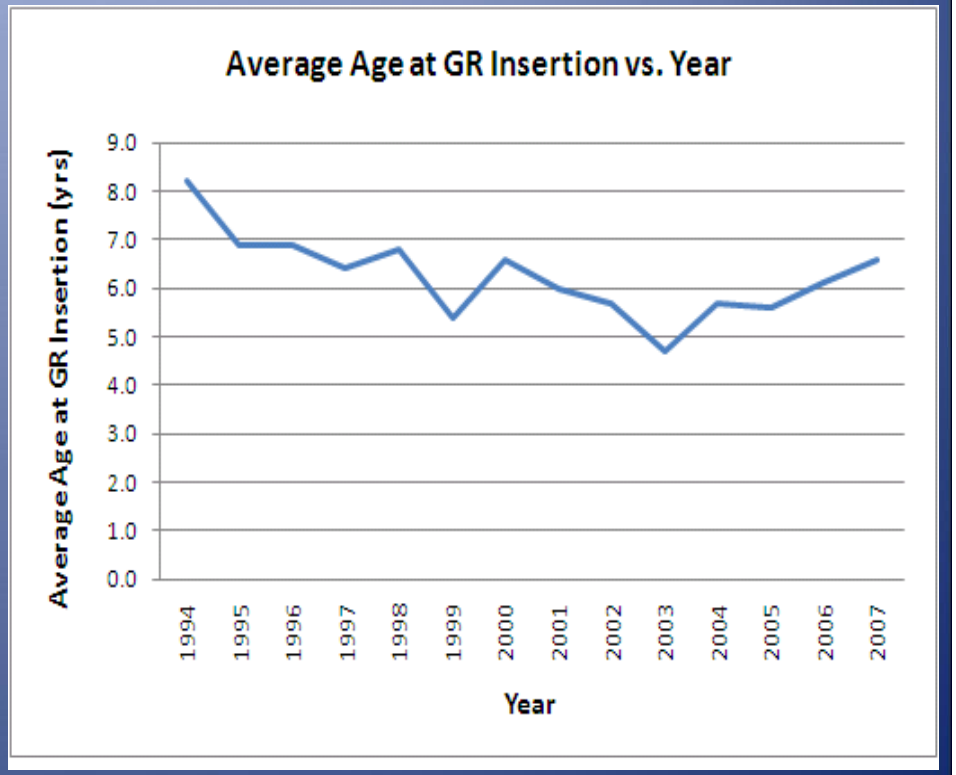
Practice Principles Survey vs. Growing Rod Database

	Principles Survey (17 surgeons)	GSSG Database (78 patients)
Final Treatment Method	71% - Replace all implants and add more anchors 24% - Don't fuse if pt. has no problems 6% - Leave rods add more anchors 0% - Bone graft with existing implants, including connectors	92% - Definitive fusion 6% - Implants removed, no fusion 3% - Rods left in place, no fusion

Results

GSSG Database Trends over Time





Results

Case-based Survey

- Growing Rods (GR) were the most favored surgical treatment option:
  - Dual GR - 41.2%
  - Non-op - 11.8%
  - Shilla - 5.8%
  - Immediate fusion - 11.8%
  - VEPTR – 24%

- There was a correlation between *increasing curve size* and the percentage of surgeons who chose GR over non-operative treatment, VEPTR, Shilla and fusion ($p=0.04$, $r=0.58$)

Conclusions

- Practice variation exists in GR treatment, but...
- There is consensus on indications for GR surgery:
  - Curve size > 50-60 degrees
  - Age <10 years of age
- Less agreement on:
  - Contra-indicated dx (kyphosis, chest deformity, myelo)
  - Lengthening interval
  - Final fusion method (evolving)
- Additional study of specifics may yield evidence