How I Decide What to Do at the End of Growth Friendly Treatment

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Disclosure

- Consulting – Depuy Synthes, Nuvasive, Globus, K2M, Ethicon,
- Speakers Bureau – Depuy Synthes, Nuvasive, Globus, Stryker, Medtronic (baclofen pump)
- Royalties – K2M, Globus, Orthopediatrics
Most Important Disclosure

My preference for growth friendly treatment is final fusion

Special Thanks to Paul Sponseller
Two Questions

• What to do at the end?
  – Fusion vs No final fusion vs instrumentation removal

• When is the end? → stop lengthening
  – Final fusion → scheduling surgery
  – No final fusion → waiting to schedule surgery
  – Instrumentation removal → waiting to schedule revision surgery
Introduction

• Historically final fusion anticipated

• Cahill et al. (2010) → autofusion common
  – Poor correction at final fusion
Final Fusion Concerns

- Stiff spine $\rightarrow$ osteotomies
- Obscured landmarks $\rightarrow$ difficult implant placement
- Weak bone $\rightarrow$ stress shielding
- Longer fusion
- Drifted anchors
- Potential increased neurological risks
It may not be over?

- 20% reoperation risk following final fusion
Instrumentation Removal

• Hope for a straight spine with some flexibility

• Yazici (ICEOS 2016) → bad idea
  – High rate of decompensation

• Too many “my next worst cases” started with “they then removed the instrumentation”
Magnetic Implants

• No long term safety profile

• Discuss need for removal at implantation
3 Scenarios at “Graduation”

• 1. Straight, not stiff
• 2. Not Straight (unacceptable/unbalanced)
• 3. Straight (acceptable) and stiff
Straight but Not Stiff

– Sponseller –

• Recent rod breakage
• Laxity at last distraction
• Add anchors + graft
Straight but Not Stiff

– Personal preference
  • Revising instrumentation
  • Improving correction – all planes
Not Straight

– Personal preference
  • Final fusion ➔ Revision surgery
  • Aggressive correction ➔ Osteotomies
Acceptably Straight and Stiff

– No final fusion
  • Skeletally Mature
  • No rod fractures
  • Stiff $\rightarrow$ diminishing returns
Acceptably Straight and Stiff

- No further surgeries
- 12 surgeries later → no more
- Done growing

CT → fused

2 years later pop in upper back

Final Fusion
While my preference is to final fuse, there are options

- Compared 137 Final fusion (FF) with 30 non fusion (NF)
- Skeletally mature
- Similar ages and diagnoses
Radiographic Outcomes

• Correction of major curve
  – NF → 48% correction
  – FF → 38% correction
  – Not statistically significant (P=0.31)

• Increase in trunk height (T1-S1 length)
  – NF → 31%
  – FF → 35%
  – Not statistically significant (P=0.64)
Conclusion

• Personal default is final fusion
  – Prepared for difficult surgery
  – 20% risk of additional surgery

• No final fusion → viable option with caution
  – Continue to follow

• Don’t remove instrumentation