

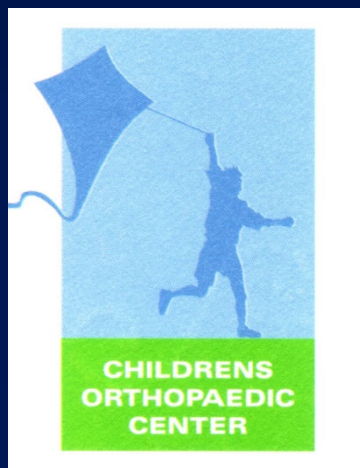
# Neurologic Risk in Growing Rod Spine Surgery in Early Onset Scoliosis:

## *Is Neuromonitoring necessary for all cases?*

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*Childrens Hospital Los Angeles*

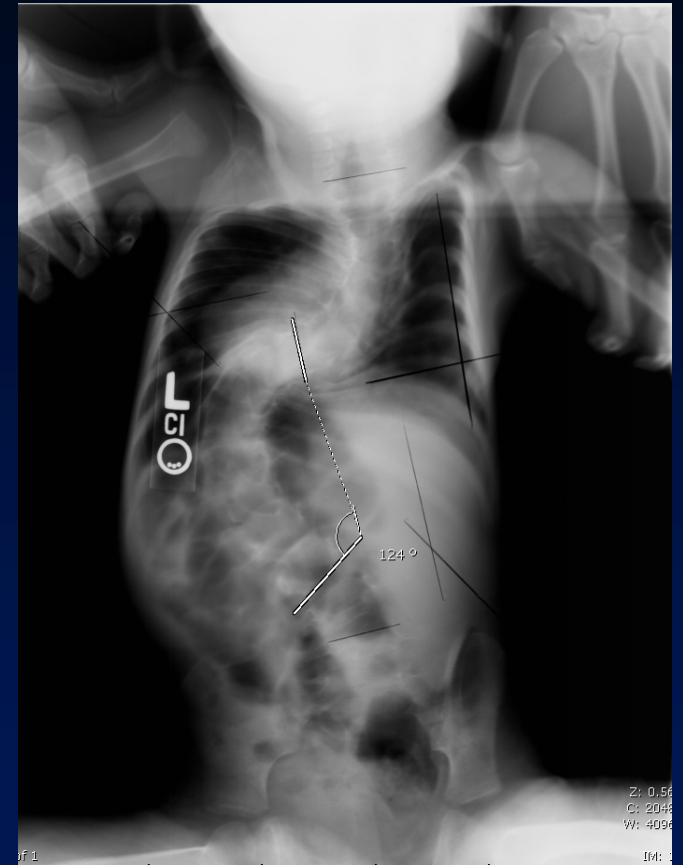
*ICEOS, Montreal, 2008*



Neurologic risk in Growing Rods

# Background

- Neurologic risk and need for monitoring well described for AIS
- Little data exists for growing rod surgeries



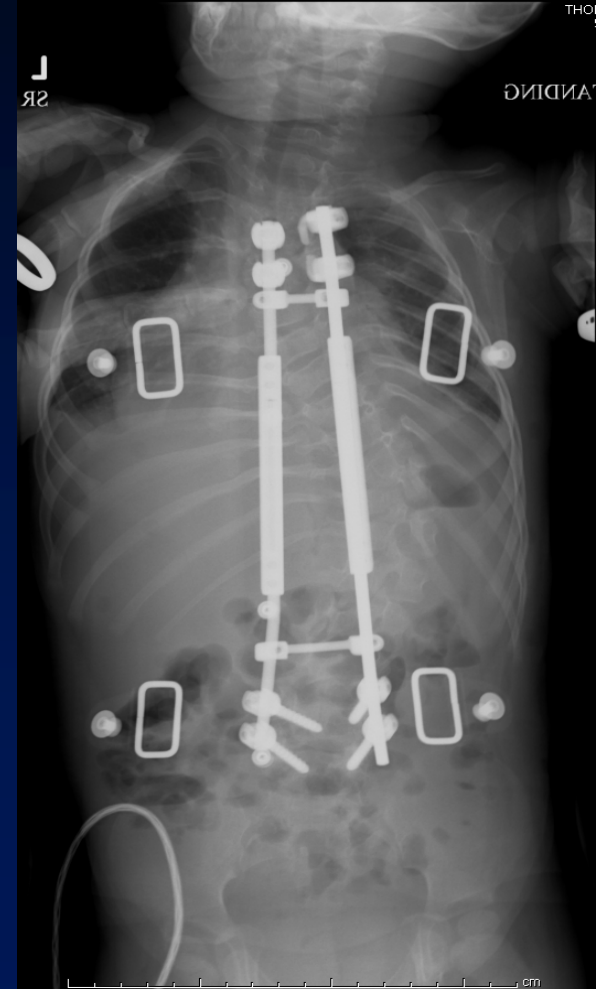
# Purpose

1. Evaluate neurologic risk during growing rod surgeries
2. Determine if intra-op neuromonitoring is necessary for all cases



# Methods

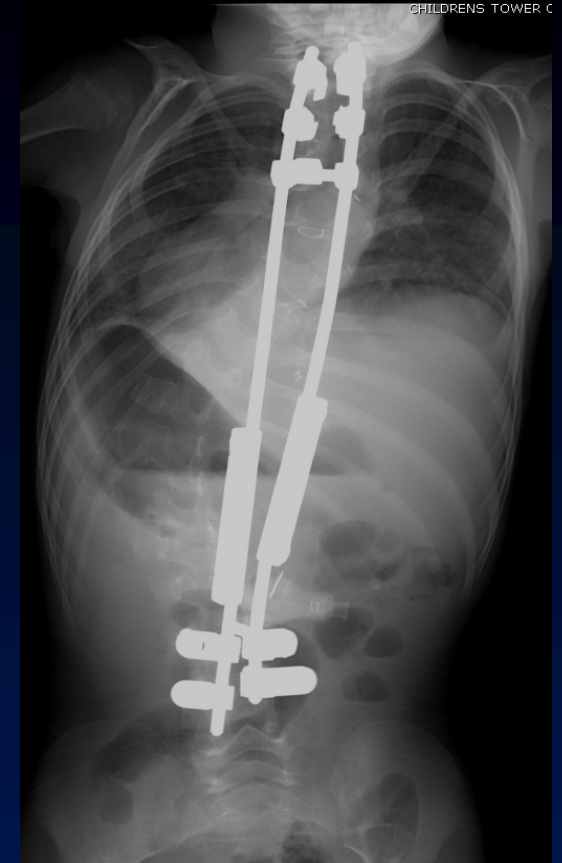
- Multi-center database of Growing Spine Study Group (GSSG)
- All Diagnoses
- Clinical Neurologic injury
- Neuromonitoring event
  - Felt to be significant
- Additional questionnaire to surgeons



## Neurologic risk in Growing Rods

# Results

- 782 Growing rod surgeries
  - 252 Primary implantations
  - 168 Implant exchanges
  - 362 Lengthenings
- Neuromonitoring Used
  - 92% primary surgeries
  - 69% exchanges
  - 61% lengthenings



70% MEP & SSEP  
30% SSEP



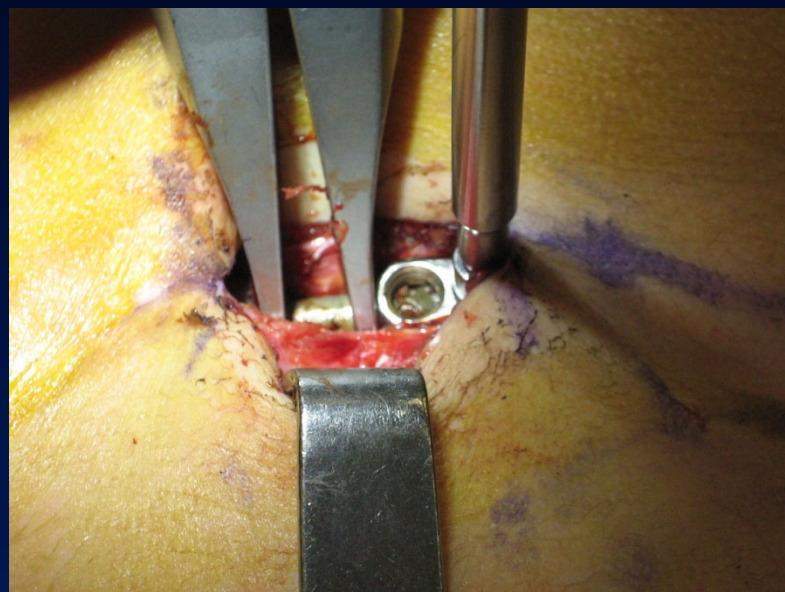
# Results

- Primary Implants
  - 2 events (1%)
  - NF, CHARGE syndrome
  - Backed off on correction--no clinical injuries
- Implant Exchanges
  - 1 event (1%)
  - Loss of SSEPs with attempted pedicle screw
  - Transient foot drop, resolved in 3 mos



# Results

- Lengthenings
  - 1 Neuromonitoring event (0.5%)
  - Lengthening reduced--no clinical injury
  - Same NF patient that had an event during 1<sup>o</sup> surgery



# Neurologic Events

## Similar to VEPTR frequency

	Growing Rod	VEPTR (Arms)
Primary Implant	1% 2/231	2% 8/325
Exchange	1% 1/116	1% 3/244
Lengthening	0.5% 1/222	0.1% 1/1185



Skaggs, et al, POSNA, 2006



# Discussion

- Incidence of neuro events in primary surgeries (1%) & implant exchanges (1%) justifies neuromonitoring
- No events in all 361 lengthenings with uneventful primary surgeries
- Is monitoring necessary for lengthenings ??



# 3 Anecdotal Cases

## monitoring changes - lengthenings

### Case #1 5yo Prader Willi

- Primary implant OK
- Lengthening #1 - lost MEPS,  
50%↓ SSEPS
  - Backed off, went slower, then OK
- Lengthening #2 – same as above



# 3 Anecdotal Cases

## monitoring changes - lengthenings

Case #2 8 yo scoliosis, lateral gaze palsy.

- Primary implant and 2 lengthenings without neuro change
- 3<sup>rd</sup> lengthening
  - MEPS lost during distraction
  - Distraction removed, signals returned
  - awoke without a neurologic deficit



# 3 Anecdotal Cases

## monitoring changes - lengthenings

### Case #3 dwarfing dysplasia

- primary surgery OK
- first lengthening OK
- 2<sup>nd</sup> lengthening neuromonitoring changes when turned prone (prior to distraction).
  - Signals normalized when supine
  - lengthened safely in the lateral decubitus



# 3 Anecdotal Cases

## monitoring changes - lengthenings

- All three had primary implants without neurologic problems
  - 2 had uneventful prior lengthenings
- No patient high risk (no intra-canal mass, no kyphotic, not congenital, etc)
- *Could this happen to any patient?*



Neurologic risk in Growing Rods

# Conclusion

Primary Implants } 1% risk  
Implant Exchange } Neuromonitor

Lengthening } ? Risk 0/361 cases

**3 anecdotal cases**



what if there was 3/3,000  
neuro events?

Primary Implants } 1% risk  
Implant Exchange } Neuromonitor

Lengthening } ? Risk 0/361 cases

**3 anecdotal cases**





# Thank You!





Thank  
You



## Neurologic risk in Growing Rods

# Results

	Monitoring Event	Transient Neurologic Deficit	Permanent Neurologic Deficit
Primary	1% (2/231)	0% (0/252)	0% (0/252)
Exchange	1% (1/116)	1% (1/168)	0% (0/168)
Lengthening	0.5% (1/222)	0% (0/362)	0% (0/362)



# Limitations

- Primary neuromonitoring data not collected
  - Tracings, amplitudes etc.
- Cannot comment on minor alerts, thresholds
- Take home message unchanged

