s Neuromonitoring necessary for /EPTR expansion and implant exchanges in Early Onset Scoliosis?

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Disclosures

- DepuySynthes Spine: Consultant, Royalties, Speaker
- Children's Spine Foundation: Research Support
- Ellipse Technologies: Consultant (wife)
- Spineguard: Consultant

VEPTR

- Rib-based distraction to treat EOS
- Many etiologies
- Repetitive surgeries
- Risk of neurologic injury with repetitive distraction?

Literature: Neuromonitoring changes with lengthening procedures

- Skaggs et. al.: 0.08% (VEPTR)
- Sankar et.al.: 0.9% (GR)
- El-Harwary et. el.: 0% (VEPTR IDE)

Neuromonitoring practices among select CSF Centers

- Monitor *New* Implants:
  - 100% (SLC, Boston,CHOP, Shriners PHL, Campbell, Denver, Columbia)
- Monitor *All* Procedures
  - Boston
- Never monitor expansions unless previous neuromonitoring changes
  - SLC, CHOP, Shriners PHL, Campbell Clinic, Denver, Columbia

CSF Database Audit Documented Neuromonitoring Changes*

	Total Implant/revision Surgeries	Total Surgeries with SSEP/MEP use	SSEP/MEP Usage %	Changes in SSEP/MEP
All Sites	3358	880	25%	1
Initial/Revision	899	346	38%	1
Expansion	2659	534	20%	0

*Preliminary data; Not completely audited

Hypothesis

Neuromonitoring is *not* necessary for routine VEPTR expansion surgery in the absence of previous neuromonitoring changes

Methods

- IRB Approved Retrospective Review of CSF Registry
- Single site (SLC)
- Single surgeon (JTS)
- Minimum follow-up of 1 year with documented physical exam

Results

- 95 children
- EOS
  - Idiopathic: 16
  - Congenital: 31
  - Neuromuscular: 36
  - Syndromic: 12
- 823 expansion or exchange procedures

Cost Estimates

- OR Monitoring Set up time @ $45/min.: 10 minutes = $450.
- Average *estimated* total monitoring cost per procedure: $1500
- Estimated potential lifetime cost of VEPTR program if monitoring for expansions: $1,234,500

Results

- Average Age: 6.05 years
- Procedures
  - Initial Implantation: 95
  - Expansion: 635
  - Revision: 98
  - Exchange: 90
- Complication rate: 20%

No documented neurologic injuries in 323 consecutive lengthening and exchange procedures

Discussion

- Documented rate of neurologic injury with expansion surgery is low
- Cost of repetitive surgery in EOS is high
- Cost of a neurologic injury is *very* high

Conclusion

- Routine lengthening surgery has minimal if any risk of neurologic injury
- Monitoring *is* recommended if there were documented neuromonitoring changes at the time of initial implant surgery
- Eliminating routine neuromonitoring offers significant cost savings over the course of treatment

Thank You