Risk Factors For Spinal Cord Monitoring Alerts In Paediatric Patients Undergoing Spinal Deformity Surgery

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Background

- With every spinal deformity surgery, there is a 0.5-3.2% risk of major neurological complications[1].
- Intraoperative neurophysiological monitoring (IONM) is the standard of care during spinal deformity surgery[2] due to its ability to detect and prevent iatrogenic neurological injuries[3].

Aims

- To identify risk factors for neurological injury during scoliosis correction surgery in paediatric patients.
- To determine the triggers and interventions of IONM changes in the alert group.

Methods

- All cases involving paediatric patients who underwent scoliosis correction surgery in a single institute between 2017 and 2022 were reviewed.
- Demographic, clinical, operative and radiological details of IONM alert patients were obtained.
- In the event of an IONM alert, the surgical team followed a standard approach to IONM changes. (CHANS – check monitoring, corrective manoeuvre, haemoglobin, anaesthesia and blood pressure, new drugs, screws)
- The alert group were checked for neurological deficits immediately upon waking up and 6 weeks postoperatively.

Table 1. Demographic factors, perioperative factors and postoperative results by group

	Non-alert	N	Alert	N	P value
Age (years)	14.0 ± 2.9	197	14.4 ± 1.3	9	0.618
Sex (F:M)	145 (73.6%): 52 (26.4%)	197	5 (55.6%): 5 (44.4%)	9	0.255
Preop. major Cobb angle (º)	63.1 ± 17.9	191	77.4 ± 24.1	9	0.022*
Postop. major Cobb angle (º)	33.0 ± 14.4	180	45.3 ± 19.4	9	0.015*
Mean corrective rate (%)	46.2± 19.4	177	40.6 ± 20.0	9	0.401
Operative time (min)	165.1 ± 52.9	111	353.3 ± 124.4	9	< .001*
Estimated blood loss (mL)	771.7 ± 350.8	158	1261.1 ± 563.3	9	< .001*

Table 2. Triggering events

	No. (%)
Insertion of screws	4 (44.4)
Rod application and curve correction manoeuvre	4 (44.4)
Corpectomy procedure	1 (11.1)

Table 3. Alert interventions

	No. (%)
Removal of instrumentation	4 (44.4)
Release of curve correction	3 (33.3)
Operation abandoned	1 (11.1)
Raised blood pressure	1 (11.1)

Results

- 206 cases and 9 significant neuromonitoring alerts were reported, consisting of 150 females and 56 males with a mean age of 14.0 ± 2.9 years.
- The alert group had a significantly greater estimated blood loss (EBL), operative time, preoperative major Cobb angle and postoperative major Cobb angle.
- There were no significant differences in age, sex, mean corrective rate and type of scoliosis (Table 1).
- IONM alert triggers included insertion of screws, rod application, curve correction manoeuvres and corpectomy procedure (Table 2).
- Interventions included removal of instrumentation and release of curve correction (Table 3).
- In the alert group, no patients experienced postoperative neurological deficits and only 1 operation was aborted due to repeated IONM alerts.

Conclusions

- Our study reaffirms the previously described risk factors in the literature.
- Longer operative time, higher EBL and greater major Cobb angle are associated with an increased risk of IONM alerts.
- IONM alerts commonly occur during and after insertion of instrumentation and curve correction manoeuvres.

References

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