

TRACTION RELATED CHANGES IN EVOKED POTENTIALS DURING SCOLIOSIS CORRECTION – A retrospective review



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INTRODUCTION

- MEPs and SSEPs monitoring has become a standard of care for posterior spinal fusion surgery (PSF). Skeletal traction is frequently used during PSF in children with severe scoliosis.
- We report a series of cases where neurophysiologic changes were observed with cranio-femoral traction (CFT)
- Aim of the study:
 - ❖ Evaluate the incidence of evoked potential changes during PSF
 - ❖ Identify factors that may be of relevance for occurrence of changes in TcMEPs whilst CFT is applied during PSF
 - ❖ If TcMEP changes were observed, the measures effective in restoring the potentials to baseline were also evaluated

METHODS

- Following IRB approval, data was collected retrospectively for all children, between June 2011 and June 2017 who had CFT applied during PSF surgery
- The same surgeon performed all surgeries and children were divided in two groups:
 - ❖ **Group-1: Changes seen in TcMEPs with traction – 18**
 - ❖ **Group-2: No changes seen in TcMEPs with traction – 23**
- Following monitors placement and inhalational induction, IV lines were secured, ETT placed, invasive BP established
- TIVA was commenced (propofol and sufentanyl) and neurophysiologic monitoring was established
- Mayfield tongs were applied to skull; patients placed prone in Jackson frame and boot traction was applied to lower extremities (up to half the body weight). TcMEPs were obtained at baseline, after traction application, during the prep phase, as well as during screw insertion and scoliosis correction.

METHODS

- Changes in evoked potentials: amplitude reduction of 50% or more, increase in latency of 10% or more
- Parameters recorded: demographic data, type of scoliosis (idiopathic/neuromuscular), location and degree of major curve (thoracic/lumbar), presence of kyphosis and changes in evoked potentials (SSEP, TcMEPs). If changes in potentials were observed, effective interventions were also recorded
- Nominal data was analyzed with chi-square test and interval data analyzed using independent sample t-test. Significance was assumed at $p < 0.05$.

Table 1.

	Changes in TcMEPs	No changes in TcMEPs	p - value
Number of patients	18	23	
Age (year)	11.88±3.87 (4-17)	11.5±3.93 (4-20)	NS
Weight (kg)	37.25±14.55 (16.6-78.1)	38.26±19.93 (16.2-86.0)	NS
Height (cm)	135.69±19.12 (99.6-168)	135.61±21.48 (96.8-171)	NS
Major curve (degree)	91.14±18.4 (60-132)	82±15.5 (50-110)	NS
Thoracic Curve only	17	11	0.0366
Kyphosis present (Idiopathic/NM)	4/8	4/10	NS
Scoliosis type (Idiopathic/NM)	5/13	8/15	NS

RESULTS

- Both groups were similar in demographics (Table-1)
- No difference was observed in type of scoliosis, severity of major curve or presence of kyphosis
- Significantly more children with thoracic curve belonged to the group who had changes in TcMEPs ($p < 0.05$)

Following three interventions were taken to restore potentials:

- ❖ Reduction/removal of traction
- ❖ Increase in MAP and
- ❖ Hardware manipulation

One intervention-6 patients; 2 interventions-8 and 3 interventions-4. TcMEPs could be successfully restored in all children

CONCLUSIONS

- TcMEPs are very sensitive to spinal cord ischemia during PSF
- We found in our evaluation that likelihood of changes in TcMEPs whilst intraoperative CFT is applied during PSF surgery is as high as 44%
- Correlation between thoracic curve and changes in TcMEPs was seen
- Neuromonitoring must be started prior to CFT, TIVA established soon after induction and muscle relaxant avoided for prompt recognition of changes in TcMEPs.
- Prompt reduction/removal of traction and increases in MAP are necessary to restore potentials.

REFERENCES

1. Lewis et al. Neurophysiological changes in deformity correction of adolescent idiopathic scoliosis with intraoperative skull-femoral traction. Spine 2011;36:1627-1638