Unexpected Intra-operative Events that Prompt Discontinuation of Pediatric Spinal Deformity Surgery

UMKC School of Medicine

Sreeharsha V Nandyala, Richard M Schwend, Nigel Price, Michael Gallizzi

UMKC SOM, Children's Mercy Hospitals and Clinics, University of Missouri School of Medicine

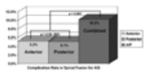
BACKGROUND

•Complications in spinal deformity surgery have 5% in anterior or posterior spinal fusion and about 10% in combined spinal fusion in adolescents[2].

•Intra-operative complications that have been studied include neurological, implant related problems, machinery malfunctions, and surgical positioning issues.

• While protocols have been established to address these problems, in rare situations, the spinal deformity surgeon may decide to discontinue the surgery due to an intra-operative problem.

•In spine surgery, multimodality monitoring is commonly used by combining somatosensory evoked potentials (SSEP), motor evoked potentials (MEP), and electromyography (EMG) to evaluate in real time the spinal cord, cauda equina, nerve roots and peripheral nerves[8].



Complications in 4369 Posterior Instrumentations and Fusions for AIS

Complication Type	No.	Incidence
Wound infection	59	1.35%
Other	59	1.35%
Pulmonary (not pulmonary embolus)	42	0.96%
Implant related	28	0.64%
Neurologic	14	0.32%
Dural tear	8	0.18%
Nonfatal hematologic	6	0.14%
Deep venous thrombosis	2	0.05%
Pulmonary embolus	1	0.02%
Blood loss (fatal)	1	0.02%
Air embolus (fatal)	1	0.02%

SRS 2006 Morbidity and Mortality Report

METHODS

•This is a single-center, retrospective study.

• From the pediatric spine deformity patient population, all aborted cases were identified and Clinical records from Cerner Powerchart® and radiographs from Synapse ® were reviewed.

•Intra-operative neuromonitoring records were also queried for details about the monitoring aspects of the case.

•The annual morbidity and mortality data submitted by the department of Orthopaedic Surgery will be reviewed to identify additional aborted spinal deformity cases.

•Cost of follow up operation and hospitalization will be acquired from the billing department to investigate the economic impact of a discontinued case.

•Aborted cases will be classified by their complications. Complication prevalence will be reported by the total number of cases

•Root cause analysis (RCA) was used to provide a structured approach to each discontinued case to analyze intra-operative complications, the corrective actions taken, and lessons to prevent future recurrences

RESULTS

•Eleven patients were retrospectively identified for a discontinued surgery

•Seven of the 11 (64%) patients developed abnormal neuromotor potentials and failed intra-operative corrective measures to achieve baseline readings.

- Subsequent diagnosis:
- One patient with Charcot-Marie-Tooth Type 1,
- One patient with medial pedicle wall breach or expansion
- One patient with spinal cord bruising

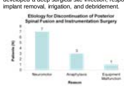
•Three (27%) developed intra-operative anaphylactic reactions (2 with cardiopulmonary instability to inhaled anesthesia and 1 with hives and dyspnea after platelets transfusion and was later diagnosed with IgA deficiency).

•One (9%) case was terminated following an unresolved neurological monitoring equipment malfunction.

•Three patients required multiple surgical interventions, during the hospital stay, to address wound dehiscence or dyspnea before they underwent completion of spinal fusion.

•All discontinued cases were safely completed at a later date when the patient was stable for surgery.

•At a minimum two year follow up, 3 (27%) patients developed a deep surgical site infection, responding to implant removal, irrigation, and debridement.



CONCLUSIONS

•Unresolved intra-operative neurological, medical, or equipment event s during spinal deformity surgery can prompt the discontinuation of surgery .

•RCA suggested that a spinal cord that was tightly approximated to an apical pedicle was at risk for a neurologic event.

•However, discontinued surgery appears to be a risk factor for late deep surgical site infection.

•RCA suggests a need for greater understanding of preoperative imaging to evaluate spinal cord proximity to the medial wall of vertebra and pedicle width size as preventative approaches against neuromotor events during surgery

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