Optimizing Care for Spinal Surgery Patients Through a Collaborative Approach to Neuromonitoring

The Problem

Patients undergoing complex spinal surgery face the potentially devastating risk of paralytic complications due to injury to nervous system structures. New approaches to intra-operative neurophysiologic monitoring of the anesthetized patient make it possible to evaluate the integrity of the nervous system, particularly the spinal cord and spinal nerves, in real time while delicate procedures are underway and to make adjustments to reduce the rate of intra-operative injury based on monitoring indicators. However, neuromonitoring is challenging:

- Surgeon, anesthesiologist, and neurophysiologist must have superb communication to ensure accurate detection of problems before they become irreversible;
- Choice of monitoring approach is complex and depends on the procedure and the specific patient;
- Numerous anesthetic agents and their administration have multiple and varying effects on monitoring results and interpretation;
- Positioning and physiologic state of the patient such as changes in temperature, oxygenation, and hematocrit also can alter readings.

Aim/Goal

The goal of the interdisciplinary team is to collaborate to create a systematic, effective protocol for instituting neuromonitoring to optimize care for spinal surgery patients.

The Team

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The Interventions

The team met to establish a common goal and approach to create consistency in a protocol for spinal surgery patients who can benefit from neuromonitoring.
Our steps were to:

- Conduct a literature review;
- Invite Dr. Adrian Gelb to Grand Rounds to learn current best practices nationally;
- Obtain detailed information from vendors;
- Educate faculty and trainees about issues and options;
- Draft a protocol and come to consensus about an approach at BIDMC.

The Results/Progress to Date

We have established several principles (below) to guide protocol development.

Principles for Intraoperative Neuromonitoring Protocol

1. Identify neuromonitoring candidates at the time of scheduling
2. Design the anesthetic based on type of monitoring desired and the known effects of each anesthetic agent, with TIVA preferred if MEPs are monitored
3. Maintain constant anesthetic concentrations
4. Maintain optimal patient temperature, oxygenation, and hematocrit
5. Communicate any intra-operative changes with the entire operating room team
6. BIS monitoring recommended to measure anesthetic depth

Lessons Learned

We have learned that although one-size-fits-all anesthesia does not exist, we can offer some guidelines to help facilitate the acquisition of the best neuromonitoring signals possible. Innovative technology coupled with guidelines and strong interdisciplinary communication offer new opportunities to eliminate patient harm.

Next Steps/What Should Happen Next

- Circulate and gain consensus on a protocol;
- Monitor and obtain continuous feedback from perioperative team;
- Carry out interdisciplinary case discussions during Faculty Hour, review data, and continuously improve the neuromonitoring protocol.

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