My orthopedic surgeon went to a meeting and now wants epidural analgesia for his posterior spine fusions.

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Objectives:
- Regional anesthesia for spinal surgery – what’s the evidence
- How to get it off the ground
- Changing culture – introduction of new therapies

Case history:
An otherwise healthy 16 year old female with idiopathic scoliosis presents for posterior spinal fusion. The surgeon requests an epidural for postoperative pain control: “it sounded like a great idea at the meeting I went to.”

Questions: What options are available for postoperative analgesia after posterior spinal fusion and instrumentation? What are some risks/benefits of various drug classes (acetaminophen, NSAIDs, opioids, ketamine, dexmedetomidine and local anesthetics)? In your hospital culture, are there restrictions on where any of these medications may be administered?

Questions: The patient’s mother asks: what are the benefits of regional anesthesia for postoperative pain management?

Questions: The patient’s mother asks: what are the risks?

Questions: The patient’s mother had a spinal anesthetic for cesarean delivery years ago, and asks if a single shot spinal would be better for postoperative pain management. What are benefits of intrathecal morphine? What are risks?

Questions: What are some of the logistics within the practice you need to arrange before proceeding with epidural analgesia? What are some anticipated challenges with postoperative epidural management for these patients?
Case Progression:
You proceed with intrathecal morphine for the 16 year old patient. She is readily extubated at the end of the procedure and does not show respiratory depression in the post anesthesia care unit.

Questions:
Does she require further monitoring overnight? Why? What is the best method to monitor for respiratory depression?

Case Progression:
The previous patient has excellent pain control for the first 24 hours. Thereafter she transitioned directly to oral opioids. Your surgeon is so pleased he would like intrathecal morphine for every spine fusion patient. His next case is a 5 year old with neurogenic scoliosis, severe thoracic constriction requiring home CPAP.

Questions:
Would intrathecal morphine benefit this patient? Would an epidural?

Case Progression:
You schedule a meeting with your department chair to discuss the surgeons request for regional analgesia for scoliosis repair patients. There are 3 other orthopedic surgeons in the group that perform scoliosis repair who are considering requesting regional analgesia as well. What do you need to discuss with your department chair and your pediatric anesthesia colleagues?

Case Progression:
Your surgeon is fairly happy with the intrathecal morphine for postoperative analgesia. He asks if an epidural would provide longer pain relief than intrathecal morphine. Your hospital does not have a pediatric pain service. You are also new staff, and have been with the anesthesia group for 1 year.

Questions:
How do you start a program to manage postoperative pediatric epidurals or other regional catheters? How do you introduce practice change?
Discussion:
Recovery from spinal fusion for scoliosis repair can be severely painful, and the pain may be
difficult to control in some patients. In otherwise healthy patients with idiopathic scoliosis,
regional anesthesia has been shown to provide improved analgesia and improved patient
satisfaction. Other benefits include earlier return to bowel function, decreased urinary retention
and earlier ambulation. Some studies have also shown decreased intraoperative blood loss and
decreased blood transfusion.

Risks of regional anesthesia for postoperative pain after spinal fusion for scoliosis include
neuraxial opioid side effects including drowsiness, respiratory depression, nausea, vomiting and
pruritus. Most studies have shown these opioid side effects have similar incidence to parenteral
opioid side effects, except for delayed respiratory depression specific to intrathecal morphine.
Epidural or intrathecal local anesthetics could cause hemodynamic instability due to sympathetic
blockade, especially with a thoracic epidural catheter. Evidence has shown, however, that
intrathecal morphine actually improves hemodynamic stability and reduces intraoperative blood
loss. Epidural local anesthetics can hide neurologic injury post operatively, however. A case
report by Purnell and colleagues was an 11 year old who had persistent paralysis after posterior
spinal fusion and epidural dosed with 20 ml of 0.25% bupivacaine. The spinal instrumentation
was removed and motor and sensory neurologic function returned to baseline 9.5 hours after the
epidural was dosed. Risk of masking neurologic injury with local anesthetic can be mitigated by
administering the local anesthetic after the patient is awakened and neurologic checks are
performed. Post operatively, using a dilute solution of local anesthetic is important so that
sensory and motor deficits can still be evaluated quickly. Neurologic injury from intrathecal or
epidural medication is a separate risk. Infection is also a serious concern due to the new
hardware in the spine, which is vulnerable to infection.

When deciding between epidural or intrathecal analgesia, logistics for the particular practice may
be important. Epidural analgesia with local anesthetic and opioid and intrathecal morphine have
been found to be effective for postoperative pain control. Intrathecal morphine is limited by
duration of pain relief (14-36 hours), but is technically simpler to deliver and monitor post
operatively. With intrathecal opioids, patients require respiratory monitoring for 24 hours post
operatively due to risk of delayed respiratory depression. Epidural analgesia can be more
flexible, and allow manipulation of opioid and local anesthetic dosage as the patient requires.
However, epidurals are more technically demanding in this population, and required frequent
intervention by nursing and physician staff post operatively. In one study, up to 37% of epidurals
failed with technical problems. (1)

The correct method of monitoring for respiratory depression remains a subject of debate.
Classically, the recommendation is for hourly checks by a nurse documenting rate and depth of
respirations AND degree of sedation, as respiratory depression is virtually always preceded by
increased sedation. A question arises of what to do with a child who is sleeping comfortably at
night: do you waken him/her every hour to assure they are not overly sedated by medications?
Electronic monitoring may be helpful, but may lead to a false sense of security. Counting
respirations with a plethysmograph may pick up chest movement when a child is trying to breath
against an obstructed airway. Drop in oxygen saturation is often a very late finding in
respiratory depression, particularly if the child has any supplemental oxygen. It also suffers from
motion artifact. End-tidal CO2 monitoring is probably most sensitive and specific (if the sample port remains appropriately placed), but is expensive to implement hospital wide.

Implementation of a new therapy can be challenging. First, the literature must be reviewed to determine safety, efficacy, and how the therapy will fit into the current practice. It is important to discuss these findings with your anesthesia colleagues and your surgeons. If the surgeons have requested the practice change as in this PBLD, the discussion will already be open. If this change is initiated by pediatric anesthesia, the discussion will need to be started with the surgeons. An effective strategy would be to present the data that would interest the surgeons. In this case, decreased intraoperative blood loss, decreased transfusion requirement and improved patient satisfaction with possible increased referrals would likely interest the pediatric orthopedic surgeon.

The anesthesia group may want to discuss the literature, personal experience, and how the group practice change would affect their individual practice. For instance, if you would like to start performing epidurals after scoliosis repair, which have been shown to require significant physician intervention, this may impact after hours “call” responsibilities for you and your colleagues. How the group and individuals will be reimbursed for this extra work should also be investigated. Changes should also be discussed with nursing staff, with education sessions prior to implementation of the new technique and equipment, as well as expectations.

Overall, medical and practice advancements are important in patient care. After review of the literature, discussion with anesthesia, surgical and nursing care teams, a new therapy can be introduced and be successful.
References:


