Thoracic Epidural Catheter Placement in Children: Are We There Yet?

There is greater awareness about the use of regional anesthesia for postoperative management of pain in children.1 As this awareness grows, the need for providing pain control, which has been established and recognized in adults, will be required of anesthesiologists treating children. An adult undergoing a thoracotomy or an upper abdominal procedure will frequently be provided with adequate pain control in the postoperative period by use of a lumbar or thoracic epidural catheter. This approach to analgesia is beneficial in the postoperative period, resulting in less nausea and vomiting, earlier discharge, and decreased need for additional analgesia.2–6 However, what happens to the 16-month-old child who undergoes a thoracotomy for a lung mass? Is it safe to place a thoracic catheter in an anesthetized child?1 Can this child be discharged from the postanesthesia care unit and sent to a regular floor or should the child be sent to an intensive care unit? These questions are difficult questions, but they are questions that dictate the practice in institutions across the country. If placing a thoracic epidural catheter in adults is considered the “standard of care” in many institutions across the country, why is the child deprived of the same privilege? Medicolegal issues often dictate the practice of medicine, and the potential for increased liability for injury is frequently offered by most practitioners as the reason for not placing epidurals in children. Those who work with children all the time, that is, those affiliated with pediatric hospitals, are the exception to this rule.

Is it safe to place an epidural catheter in a child, particularly in the thoracic epidural space, if the patient is under general anesthesia?2 This question has been a debate among most pediatric pain practitioners. Krane et al.7 wrote an elegant editorial in this journal about the need to understand that regional anesthesia catheters should be placed in children with caution but under general anesthesia. Most pediatric practitioners would agree that placement of an epidural catheter in an anesthetized child would be safer because we would not have to worry about children who are “moving targets” and increase the chances of subarachnoid block or nerve damage. Although there are numerous reports of the use of regional catheters, particularly thoracic catheters in children and adolescents, it is still not the standard of care in children undergoing high abdominal or thoracic surgery.8–11 Certainly our experience with caudal blocks is substantial enough to allow the highly safe passage of a catheter through a caudal needle into the epidural space with minimal potential for dural puncture. However, we must also acknowledge the fact that these catheters can kink, turn caudad, or migrate toward one of the nerve roots. This reality leads us to the next question: What is the best way to determine correct placement of a thoracic epidural catheter in an anesthetized child?

In the article in this issue by Tamai et al.,12 the authors have presented a case series of 10 children under the age of 4 years, who had a stimulating catheter placed via a caudal route in the thoracic epidural space. They successfully placed the catheter in 9 of 10 children at the time of initial insertion and in 1 patient after recognizing a kink at the end of the catheter. The stimulation technique as described by Tsui et al.13–17 was utilized for recognition of correct placement of the catheter.
tip of the catheter at the desired dermatome. This leads us to further ponder what technique is best for placement of a thoracic catheter in the anesthetized child.

Techniques for determining placement of a catheter in patients under general anesthesia include identifying the radiographic location of the catheter tip using contrast dye, using a plain x-ray to localize the tip of a radiopaque catheter, and using the stimulating technique described in this issue.

There are obviously advantages and disadvantages with the use of the above-mentioned techniques.

1. Using contrast dye can lead to anaphylaxis. The cost involved in the use of dye can be exorbitant because a separate vial of contrast material is utilized for each individual catheter placement, and an x-ray and fluoroscopy have to be obtained to determine the position of the catheter and contrast material.

2. A plain x-ray subjects the patient to unnecessary radiation and increases the cost of the procedure.

3. The stimulating technique requires special and more expensive equipment, as well as technical expertise. However, a potentially important advantage is that by using this technique, one can determine whether the catheter is in the subarachnoid space versus the epidural space (segmental dermatomal stimulation will be recognized at a lower amperage in the subarachnoid space [0.3 mA] when compared with the larger amperage [1 to 10 mA] required to stimulate in the epidural space).18,19

Caution should always be exercised for catheter placements, particularly in children. Adolescent and teenage children should be provided an opportunity to undergo catheter placement with minimal sedation before undergoing general anesthesia. Should the caudal route be utilized for catheter placement rather than a lumbar route? The answer depends on personal preference and individual comfort and expertise. I prefer placing lumbar or thoracic epidural catheters in infants and children under 2 years of age using the caudal route, but I prefer placing a lumbar or thoracic epidural catheter close to the surgical dermatomal level in older children. The Tsui technique is easy to perfect and is probably one of the better determinants of catheter tip placement without any extra radiographic examinations. The ability to use more regional catheters in children will also stimulate the need for biomedical research to provide our future generations with more viable options for utilizing equipment that is state of the art and not those that have been trialed in adults for 2 decades before becoming available to children. It is my conclusion that we are at the brink of a new era for improving the accurate placement of regional anesthesia catheters in anesthetized children.

Santhanam Suresh, M.D., F.A.A.P.
Children’s Memorial Hospital
Feinberg School of Medicine
Northwestern University
Chicago, IL

References


