

EDITORIAL

How should pediatric anesthesia respond on the discussion about neurotoxicity in daily practice?

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The current discussion of the impact of narcotics on the neurological development of neonates and small children is a result of animal studies. Invariably, the exposure to anesthetic agents in these studies was not consistent with routine clinical practice and the experimental setup a consequence of the desire and need to obtain a significant result in order to ensure publication.

Only fragmented and contradictory evidence is available for humans, however, various scientific publications call for a "heightened level of concern" on this issue.¹ Furthermore, the non-scientific media has processed this topic providing various articles and editorials with alarming headlines such as "Does anesthesia make your child stupid?". Both the academic and lay press create the impression of this being a statement rather than a question. A recent alternative view editorial highlighted that maintaining homeostasis (avoiding arterial hypotension, hypocapnia, hyponatremia and hypoglycemia) may be even more important for the neurodevelopment of premature babies. It also suggested that these imbalances are too often tolerated during daily anesthetic practice. Although this message is providing a balance and is absolutely correct, the distinctive headline "Anesthetists rather than anesthetics

are the threat to baby brains"² certainly fueled the emotional component of the debate. The impact of this topic in pediatric anesthesia is very noticeable during daily practice and will undoubtedly remain prevalent in the future. Apart from the increasing anxiety of parents and other medical specialties, it must be assumed that lawsuits concerning disabled premature children will increasingly focus on the anesthetic care.

In this issue of *Minerva Anestesiologica*, a survey by Frank Weber *et al.* tackles the impact the discussion about neurotoxicity has on pediatric anesthesiologists.³ They focused on the thoughts of the colleagues and if they have changed their daily practice as a consequence. By contacting the participants in the APRICOT Trial (www.esahq.org/apricot), they reached a large, selected group of scientifically interested pediatric anesthesiologists from all over Europe. This study is able to add valuable information to assess the influence of the current knowledge and discussion about neurotoxicity on the daily routine of pediatric anesthesia specialists in Europe.

Surprisingly, only half of the participants (mostly specialists in anesthesia) felt themselves well informed about the issue of neurotoxicity in pediatric anesthesia. Two thirds of the participants reported that neurotoxicity affected their daily practice, in most of the

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cases only affecting the preoperative planning.

Just 18% reported changes in their individual practice of anesthesia. A remarkably portion of one third of the participant declared an anesthesia without the use of anesthetics (high-dose opioids only and muscle relaxant drugs) to be ethically justifiable. The intention is to avoid cardiovascular instability in those vulnerable patients. There is good evidence from neonatal intensive care that inadequate sedation and analgesia is harmful for developing babies both physically^{4,5} (increasing rate of cerebral hemorrhage) and psychologically^{6,7} (life-time reduced stress and pain-tolerance). This statement, however, does not answer the question, if adequate pain and stress relieve can be achieved by opioids only (for instance remifentanyl) or not. At this point, no final judgment can be given and one should not create the impression of being able to achieve this. It just remains to note that some experts perform anesthesia without sedative drugs and some do not.

Modern pediatric anesthesia should be able to achieve both adequate depth of anesthesia and pain control as well as stable cardiovascular conditions. As long as essential questions in neurodevelopment are not answered conclusively, pediatric anesthesiologists should rely on what is known and can be summarized clearly:

1. local anesthesia should be used wherever applicable and possible (e.g. as a sole method); this allows the amount of sedative medication to be kept low but still achieving clinically adequate depth of anesthesia.

2. the focus on homeostasis should result in proper monitoring using all modern methods that are available (e.g. generous use of invasive blood pressure measurement and transcutaneous capnography);

3. a compromised cardiovascular situation must be addressed immediately with appropriate fluid therapy and catecholamines. This requires prior preparation and practical knowledge (e.g. a list how to prepare practicable dilutions and weight-dependent drug-rates). This is institutional competence;

4. this institutional competence also requires the treatment of vulnerable babies within well-prepared structures; this necessitates adoption of institution-wide teaching and education of their special needs;

5. pediatric anesthesia should be performed or supervised by trained pediatric anesthesiologists only. It is well accepted that this group can provide stability and will result in less complications than someone only occasionally treating such patients;

6. finally, pediatric anesthesiologists should respond and be recognized as competent partners for perioperative medicine of a very special patient group. As such they must be involved in the planning of the necessity and best time point for elective surgery to reach the best possible compromise between surgical interests and the issue of an optimal patient safety.

Frank Weber *et al.* defend a “wait-and-see” kind of approach concerning the influence of the daily practice due to the debate on neurotoxicity and supported this by valid evidence and an unexcited but consequent questioning of daily practice. This is actually the only reasonable way forward. We share their desire for more evidence from future clinical prospective trials. We would like to extend this request to an increased use and evaluation of comprehensive cardiovascular and cerebral monitors (e.g. NIRS). We need to get close to an optimal homeostasis until now the ‘other’ important but less recognized threat to baby brains.

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