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Asleep or awake: is paediatric regional anaesthesia without general anaesthesia possible?

Per-Arne Lönnqvist

Department of Physiology & Pharmacology, Karolinska Instituet, Karolinska University Hospital, Stockholm, Sweden

E-mail: per-arne.lonnqvist@ki.se

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The modern use of paediatric regional anaesthesia started in the mid-1980s, and became more widely practiced after the first World Congress on Pediatric Pain in Seattle 1988. However, soon voices were raised questioning this practice since the majority of the blocks were performed with the child either anaesthetised or deeply sedated, which was perceived as being associated with unnecessary risk ('double the anaesthetic, double the risk'). In adult practice it was seen as contraindicated to do blocks in anaesthetised patients because of the patient's inability to report warning signs of potential nerve injury or signs of local anaesthetic systemic toxicity.[1] These comments resulted in a massive counter-argument. Most of the world's most influential paediatric anaesthetists published a joint statement[2] saying that it was considered safe and best practice to perform regional anaesthesia in anaesthetised children.

This was followed by two prospective large scale multicentre studies from the ADARPEF (French Language Society of Paediatric Anaesthesia)[3,4] and a report from the Pediatric Regional Anesthesia Network (PRAN) based on the prospective collection of more than 100 000 paediatric nerve blocks,[5] all showing that the rate of complications is reassuringly low. Recently published joint practice guidelines regarding the safe practice of paediatric regional anaesthesia from the European and American Societies of Regional Anaesthesia conclude that there is sound evidence to recommend that regional blocks can and should preferably be performed under anaesthesia or deep sedation in children of all ages.[6] Data from the PRAN even suggest that performing regional anaesthesia in awake or only lightly sedated children carries an increased (but still very low) risk of postoperative neurologic symptoms.[7] Thus, the case would appear to be closed concerning how to perform regional anaesthesia in children.

In this issue of the *British Journal of Anaesthesia*, Zadrazil and colleagues[8] report their experience of 565 cases collected over 4 yr from their hospital database that shows proof of concept that paediatric regional anaesthesia, in this case upper extremity blocks, can be performed even without general anaesthesia or deep sedation.

Does the Viennese concept apply to all age groups?

It is apparent from their data that regional anaesthesia can be applied in any age group from infants to adolescents. However, the number of patients in the youngest and oldest age groups were quite limited, thus additional data concerning these patient groups will be necessary before adopting this new approach fully.

What is the need for conversion to general anaesthesia (failure rate)?

Conversion to general anaesthesia was reported in 5.1% of patients overall. Contrary to expectation, the failure rate increased with age. Blocks were performed by a total of 35 different anaesthesiologists. Perhaps the younger patients were treated by more experienced and better trained paediatric anaesthetists while teenagers and adolescents were treated more frequently by generalists or registrars who may not possess the same skill set as the Viennese paediatric group. This may be inferred from the fact that the failure rate in the older children (near adults) was higher than that reported for ultrasound-guided brachial plexus block in adults from the same institution.[9] In many places the adult anaesthetists are more proficient in ultrasound-guided regional anaesthesia than their paediatric anaesthesia colleagues. Support for this has recently been presented in the Europe-wide APRICOT study that showed that paediatric regional anaesthesia is still not as widespread as it deserves to be across Europe.[10]

Premedication or light sedation *vs* deep sedation for regional block placement

Zadrazil and colleagues[8] strictly labelled blocks that only needed one supplemental dose of i.v. fentanyl as block failures. Despite this, a broad range of sedative drugs was used to accomplish blocks and to perform the surgical intervention. In a previous report from the same group describing the use of 'awake' epidural blocks in infants undergoing pyloromyotomy,[11] large doses of supplemental anaesthetic drugs (e.g. propofol, midazolam, and fentanyl) were needed to successfully perform the block and the surgical procedure, which raised the question of where to draw the line between awake or light sedation *vs* deep sedation or general anaesthesia (even without a protected airway). This gave rise to an accompanying editorial[12] that questioned the wisdom of adopting this practice by the general anaesthetist without the special skills that the Viennese group possesses. Although the target group of patients is different in the study by Zapradil and colleagues,[8] the same issue is still relevant. Thus, before adopting this approach one should predefine how much supplementation with other drugs is acceptable and when, for the sake of safety, one should convert to proper general anaesthesia. This should be done to avoid unnecessary deep sedation or general anaesthesia with associated risks.

What fasting regimen is appropriate?

Paediatric fasting guidelines have become less strict in recent years. Paediatric anaesthetists in Uppsala, Sweden have been drivers in this development, even questioning fasting times for semisolids and solids.[13] Thus, children having 'awake' regional anaesthesia may be a group where even more liberal fasting rules may be appropriate. If use of the Viennese concept makes it possible to reduce the traditional waiting times for fasting, it could perhaps result in more effective use of limited hospital resources. Further studies, with this as a primary endpoint, will tell if this vision will become reality or not.

What is the frequency of nerve injury-like sequelae and other complications?

This question is always of seminal importance. It is reassuring that there were no cases of compartment syndrome or infectious complications. A further issue is the incidence of nerve injury, and there were no cases of acute nerve injury observed in the study. However, Taenzer and colleagues[7] reported data from the PRAN which indicate that performing blocks awake or under light sedation is associated with a higher frequency of postoperative neurologic symptoms than doing the blocks under anaesthesia.[7] However, no data appear to have been registered into the Vienna database regarding this issue, and therefore we do not know the outcome with regards to this parameter in their cohort. Perhaps this group will produce prospective data regarding this issue in years to come.

In summary, Zadrazil and colleagues[8] should be congratulated on reporting their experience with performing regional anaesthesia in awake or lightly sedated children of all ages. This may well become the preferred way forward in selected groups of paediatric patients, but use of ultrasound guidance must be viewed as obligatory.

Declarations of interest

The author declares that they have no conflict of interest.

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