Ultrasound Guided Regional Anaesthesia for Paediatrics

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Regional anaesthetic procedures are frequently performed in children for anaesthesia or analgesia during the preioperative period. Currently one has to rely on surface anatomical landmarks, fascial clicks, loss of resistance, eliciting paresthesia or nerve stimulation to position the block needle in the vicinity of the nerve. Anatomical landmarks provide valuable clues to the position of the nerve but are surrogate markers, lack precision, can vary among children and may be difficult to locate in the obese child. Moreover children also come in different shapes and sizes and regional anaesthetic procedures are generally performed after the child is anaesthetized, which pose a challenge to the paediatric anaesthesiologist. Even nerve stimulation which has been recommended as the gold standard for nerve localization in regional anaesthesia may not always elicit a motor response. It also does not guarantee success and serious complications can still occur. Moreover one cannot predict the accuracy of needle placement prior to skin puncture with any of the above methods. Recently there has been an increase in interest in the use of ultrasound to guide peripheral and central neuraxial blocks in children. This has become possible due to improvements in ultrasound technology and the availability of portable ultrasound devices which produce high resolution images comparable to the high-end cart based ultrasound systems.

Ultrasound guided regional anaesthetic blocks may offer several advantages. Ultrasound imaging is non-invasive, safe, simple to use and does not involve exposure to radiation. It allows the target nerves and the surrounding structures to be directly visualized during block placement, which is particularly advantageous in children with difficult or variant anatomy, obesity or amputated limbs where evoked motor responses cannot be visualized. It also helps to decide on the best possible site and maximum safe depth for needle insertion, allows real-time guidance of the needle and needle tip to the target site, avoid inadvertent vascular or pleural puncture and visualize the spread of the injected local anaesthetic in real-time. However data comparing ultrasound with conventional methods of performing regional nerve blocks in children are still limited. Current evidence in children suggests that ultrasound speeds the execution of peripheral nerve blocks, reduces the discomfort experienced during block placement, reduces the amount of local anaesthetic required, speeds the onset of sensory blockade, improves the quality of sensory-motor blockade, and prolongs the duration of sensory blockade. When used for central neuraxial blocks it offers technical advantages, reduces the incidence of bony contact, facilitates faster epidural catheter placement and one is also able to visualize the spread of the local anaesthetic within the epidural space in real-time. There are no data showing improved success rate or reduced neural complications using ultrasound for regional anaesthesia. This may be partly be due to a lack of adequately powered studies evaluating such outcomes in children and the inherent low incidence of complications. In this presentation, our current understanding of ultrasound guided regional anaesthesia in children will be reviewed.