Are peripheral and neuraxial blocks with ultrasound guidance more effective and safe in children?

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CRD summary
This review assessed the efficacy and safety of ultrasound guided neuraxial and peripheral nerve blocks, concluding that there were advantages, but safety was only demonstrated in children for ilio-inguinal blocks. Given poor reporting of the review process, uncertainty over the number of included studies and study designs of relevance, the authors' conclusions should be interpreted with caution.

Authors' objectives
To assess the efficacy and safety of ultrasound guided neuraxial and peripheral nerve blocks in children.

Searching
MEDLINE, EMBASE Drugs and Cochrane Evidence Based Medicine were searched for English-language studies from 2004 onwards. Search terms were reported. References were handsearched to identify additional articles. Recent paediatric anaesthesia and surgical journals were also searched.

Study selection
Eligible studies were randomised controlled trials (RCTs) in children that compared either ultrasound guided neuraxial blocks or peripheral nerve blocks with other techniques. Additional study types were also included in the review, including prospective, descriptive and case studies.

Outcomes reported for included studies comprised: success rate; performance time of blocks; vertebral/bone contact; direct visualisation of dura; onset of blocks; complications; duration and local anaesthetic volume.

Neuraxial blocks included: lumbar/thoracic epidural placement; intraoperative or postoperative epidural placement; and lumbar/thoracic epidural puncture. Peripheral nerve blocks included: brachial plexus; sciatic and femoral blocks; ilio-inguinal and ilio-hypogastric blocks. In included studies, ultrasound guidance varied in terms of percentage, duration and volumes.

Three independent reviewers selected the studies for inclusion, and disagreements were resolved by consensus.

Assessment of study quality
The studies were assessed for validity using the Jadad scale, which awards up to 5 points for the criteria of randomisation, blinding and treatment of withdrawals and dropouts.

The authors did not state how many reviewers performed the validity assessment.

Data extraction
Data for outcomes were extracted as either percentages, differences in duration or volume.

The authors did not state how many reviewers performed the data extraction.

Methods of synthesis
A narrative synthesis was provided, supported by tables, with differences between studies discussed in the text.

Results of the review
At least nine studies were included in the review (including at least 649 participants). Jadad scores ranged from 2 to 5 points.
For ultrasound guidance with smaller volumes of local anaesthetic, prolonged sensory blockade was reported (two studies).

For neuraxial blocks, epidural puncture and dura were visualised in 100% of children (three studies), epidural catheter was visualised in the epidural space in an average of 97% of patients (four studies), and injecting medication or saline solution into the epidural space was visualised in 96% of patients (four studies).

In separate studies, the final epidural catheter position was confirmed in 78.2% of cases and complications (bloody tap and dural puncture) in 5% of cases.

**Authors’ conclusions**

Compared with traditional nerve stimulation-based techniques for regional block, ultrasound guidance had some advantages, but its safety was only demonstrated in children for ilio-inguinal blocks.

**CRD commentary**

The review question was clear and there were broad inclusion criteria for participants and intervention, but not for outcomes and study design. Although the authors stated inclusion criteria for study design, it appeared that additional study designs were included in the review. The literature search for English-language publications was restricted to three databases, and it was unclear whether unpublished studies were sought; language bias could have been present and some studies may have been missed. The selection of studies for the review was undertaken in duplicate, but it was not clear whether this also extended to data extraction, so it was not clear whether methods were used to minimise error and bias. Appropriate criteria were used to assess the quality of the included RCTs, but it was not clear whether this was undertaken by multiple reviewers. Given the apparent heterogeneity across studies, a narrative synthesis appeared appropriate. There appeared to be discrepancies between the text and findings reported in tables. Poor reporting of the review process meant that it was unclear how many studies constituted the evidence-base for the review, whilst some of the included studies did not appear to be RCTs, contrary to the authors’ inclusion criteria. Given the poor reporting of the review process, uncertainty over the number of included studies and study designs of relevance, the authors’ conclusions should be interpreted with caution.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated that large multicentre RCTs are required to assess the safety of ultrasound guided blocks over nerve stimulation/blind technique, and ultrasound guided peripheral nerve and neuraxial blocks. Further RCTs are needed to demonstrate the safety and benefit of ultrasound guided neuraxial or peripheral nerve blockade over standard techniques.

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