Safe dose of levobupivacaine (Chirocaine®) in caudal analgesia in children

Editor—Caudal analgesia is commonly used for postoperative pain relief in children of all ages having surgery below the diaphragm, as confirmed in Sanders' recent survey of UK practice of paediatric regional anaesthesia.1 Bupivacaine is named as the most common local anaesthetic drug of choice, and it would have been interesting to know what dose of local anaesthetic was used. The isomer levobupivacaine (Chirocaine®) is now regularly used in the Manchester Children's Hospitals, for theoretical reasons of improved safety.2 I have conducted an audit, looking retrospectively at the doses of levobupivacaine used in the caudal space over the last six months by anaesthetists at Booth Hall Children’s Hospital in Manchester.

I studied the operating theatres’ recovery book, and extracted the case numbers of all patients recorded as having caudal analgesia during the period March to September, 2002. I then looked at the patient records and noted the dose of local anaesthetic used and the weight of the patient. I calculated the dose of levobupivacaine received in mg kg⁻¹ and plotted this on a scatter chart (Fig. 1).

There were 79 caudals recorded as having been performed, but only 44 (56%) case records were present in the medical records department at Booth Hall. Twenty records were absent with unknown whereabouts, eight records were held at another hospital site, and seven were tagged as absent (e.g. for clinic appointment). Surgical operations ranged from inguinal herniotomies [32/79 (41%)], to circumcision, orchidopexy, hydrocoele repair, and exploration of testicular torsion. The weights of the children ranged from 2.8 to 59 kg, and ages ranged from 8 days to 14 yr with 64/79 (81%) being <6 yr old. An aseptic technique was recorded as being used by the anaesthetist in 34/44 (77%) of the records. A 22-gauge Jelco® cannula was used in 28/44 (64%) of cases, a 20G in six cases, 18G in two, 24G in one, 21G needle in one, and no reference was made in five cases. The local anaesthetic used was plain 2.5 mg ml⁻¹ levobupivacaine (Chirocaine®) in all but two cases, who received bupivacaine 0.25% with epinephrine (1 in 200 000) at a dose of 2.5 mg kg⁻¹. The dose of levobupivacaine was in excess of the possible limit of 2 mg kg⁻¹ for bupivacaine in 16/44 (36%) of patients. The majority of these patients were <20 kg. Three patients weighing >30 kg received relatively low doses of local anaesthetic, but they also had clonidine (range 1–1.5 μg kg⁻¹) added to the caudal space. No other adjuvants were used.

Although levobupivacaine 1.25 mg kg⁻¹ each side is recommended for ilio-inguinal nerve block,3 there is no evidence to support the recommended maximum dose of levobupivacaine for caudal analgesia in children. Is it assumed to be the same as the limit recommended for bupivacaine at 2 mg kg⁻¹ (although this drug is not yet licensed for use in children)? In this audit, more than one-third of patients received a dose in excess of this, but came to no harm. Further formal studies are needed, but I have shown that administering a dose of levobupivacaine 2.5 mg kg⁻¹ into the caudal space in children is a common practice at our hospital and has produced no clinical problems.

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Editor—Thank you for the opportunity to reply to Dr Smith’s letter on the dosing of levobupivacaine in paediatric caudal analgesia. Although much potentially valuable data was not analysed from the 35/79 (44%) medical records, which could not be located, some interesting points arose.

In 42/44 (95%) of caudals in Smith’s report, levobupivacaine was the local anaesthetic of choice. In my survey, levobupivacaine was used by only 7/210 (3%) of respondents.1 It is exciting to see development and change for the patients’ benefit in our practice, brought about by new evidence on the possible reduced toxicity of levobupivacaine compared with bupivacaine. This is the sort of fact-based, highly transferable knowledge alluded to in my paper that can spread rapidly in the medical community. In Smith’s report, only 3/44 (7%) of local anaesthetic doses had an adjuvant added. Lack of opiate adjuvants could be because the cases reported were suitable for day surgery. Of more interest, is the lack of use of epinephrine. Although the interpretation of test doses can be difficult in the anaesthetized child, many authorities recommend the use of epinephrine in test doses and monitoring for heart rate changes as well as changes in ECG morphology.4 5 It would be useful to know how test doses were interpreted.

My survey did not attempt to record the doses of local anaesthetic used in caudal analgesia. Doses are dependent not just on weight, but also on operative site and the age of the patient. Toxicity of local anaesthetics is potentially increased in infants, and especially neonates, because of decreased plasma protein binding of the drug and increased elimination half-time. Consequently, recommended bupivacaine doses are reduced by...
half in the neonate. An analysis of dosing by age in the report would have been of interest. If reduced toxicity is a prime concern, ropivacaine has been shown to be less toxic than levobupivacaine and bupivacaine in isolated heart preparations, and whole animal preparations. Ropivacaine has been available for longer than levobupivacaine and there are a substantial number of clinical studies supporting its use. For all of these drugs, maximum allowable doses must be considered carefully, as toxicity depends not only on dose of the drug and the weight of the patient, but also on age, physiological status, speed of injection, and site of injection. Although no adverse events were reported in the records reviewed, care must be taken in generalizing on the safety of the doses reported, especially in the very young, the acidotic patient, or those with decreased levels of \( \alpha-1 \) acid glycoprotein and albumin.

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