It has long been common practice to inject a test dose of local anaesthetic when performing extradural block. This is undertaken in order to determine if the needle or the catheter tip is inadvertently within either the subarachnoid space or an extradural vein. A few millilitres of local anaesthetic injected into the subarachnoid space produces an obvious spinal anaesthetic after some minutes. An i.v. injection can be diagnosed if adrenaline is added to the test dose in sufficient quantity to cause a marked but short-lived tachycardia. All seems logical and clear, yet several doubts still remain as to the efficacy of test doses. Many anaesthetists do not use them unless they have serious doubts on the correct position of the needle or catheter. Moreover, in the great majority of reported cases of high/total spinal anaesthesia, or serious systemic toxicity, during attempted extradural block, a test dose was used. False negative tests are dangerous. False positives are a considerable nuisance, as the procedure must be repeated when in fact there is no incorrect placement.

False negative test doses for intrathecal placement are a result of an inadequate dose being used, an insufficient time being allowed for a spinal anaesthetic to develop, or inadequate testing for a spinal anaesthetic. Thus to inject 2 ml of 0.25% bupivacaine, wait 2–3 min and then ask the patient to move the feet or toes will give a negative result more often than a positive one if the drug has indeed been injected into the subarachnoid space. Such a small amount of bupivacaine will not cause motor paralysis for several minutes, if at all. The patient must be asked about subjective sensations in the lower limbs such as warmth, tingling or numbness, and if necessary testing with pinprick or cold sensation should be carried out. A larger dose, 4–5 ml, is likely to produce a more rapid and clearly defined response, without danger of an unduly high spinal blockade. However, the ordinary solutions of bupivacaine (being isobaric or slightly hypobaric) are slow to act compared with hyperbaric solutions and there is logic in using such a solution, say 1.5–2 ml of 5% lignocaine, which will give an obvious spinal block in 2–3 min, especially in the dependent limb of the patient in the lateral position.

Subdural injections of local anaesthetic are notoriously difficult to diagnose because, although they cause widespread blockade, this is often slow in onset. The use of high concentration–small volume test doses could make the diagnosis easier.

For determining i.v. placement, the situation is more complicated, as most test doses, even 4 ml of 0.5% bupivacaine, produce only minimal subjective symptoms in the patient. This has led to the inclusion of adrenaline in the test dose and it has been shown that even small quantities, for example 4 ml of 1 in 200 000 (20 μg) adrenaline will cause an increase in heart rate of 20–40 beat min⁻¹. However, the detection of this evanescent effect requires continuous monitoring of the heart rate (using an ECG and not a finger on the pulse). In some nervous subjects, it is difficult to get a stable rate before injection, and increases of 20 beat min⁻¹ commonly occur spontaneously. Unpremedicated mothers about to undergo Caesarean section are not among the calmest of patients, and are already under the influence of endogenous adrenaline. Increasing the dose to, say, 40–50 μg would make detection of i.v. placement easier.

An important confounding factor in this whole problem relates to extradural catheter design and the use of multiple holes. It is easily demonstrated that a low pressure, slow injection causes the injectate to escape from the proximal hole, while a high pressure, fast injection causes it to escape from the distal hole. As the holes are nearly 1 cm apart on some catheters, it is possible to have the distal hole misplaced, and the proximal one...
correctly placed within the extradural space. Although single-hole catheters are available, for some reason they are not popular. If multiple holes are preferred, the test dose should be given rapidly.

Probably the most dangerous aspect of a false negative test dose is the confidence it inspires in the anaesthetist that all is well and the main dose can be injected with impunity. Thus very large amounts are given before it is obvious that the drug has been administered i.v., and may considerably exceed the convulsant dose and cause cardiovascular collapse. As noted in the accompanying paper, it is the rate of increase of brain concentration of local anaesthetic, rather than a defined plasma concentration which causes CNS symptoms [1].

The anaesthetist must have a high degree of suspicion that, in spite of a negative result, misplacement can still be present. Paradoxically, if a test does not use, it is much easier to entertain this suspicion and to be much more cautious when injecting the main dose. To avoid disasters the following should be adhered to:

1. After insertion of the needle or catheter, gently aspirate and observe any fluid leaving the extradural space.

2. If a test dose is used, inject sufficient drug (with added adrenaline) rapidly and wait long enough to detect any effect. During the first 90 s, observe the heart rate continuously and do not accept the absence of spinal anaesthesia in less than 5 min. Question the patient for subjective effects.

3. Even if the test is negative, the main dose must be injected slowly, for example, not faster than 10 ml min⁻¹ or in 5-ml aliquots every 60–120 s. Talk to the patient throughout the injection and ask for the early symptoms of toxicity, such as numbness of the mouth, tinnitus, etc. Beware of the patient who talks or behaves strangely.

4. Be prepared to deal expeditiously (and successfully) with either systemic toxicity or a high/total spinal block. The procedure for these should be laid down in each unit and well known to junior staff performing extradural blockade.

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REFERENCE