Comparison of room temperature and body temperature local anaesthetic solutions

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SUMMARY. The injection of local anaesthetic solutions is painful. We report the results of a blinded randomised controlled trial comparing the pain of injection of local anaesthetics at room temperature and body temperature. The results show that local anaesthetic solution injected at body temperature produces significantly less pain than local anaesthetic injected at room temperature.

Local anaesthetics produce pain on skin infiltration (Morris and Whish, 1984) and this pain is often severe enough to be the patient's main worry about a local anaesthetic procedure. Several papers have explored the relationship between various factors and the pain of injection with conflicting results (Rood, 1977; Finkel and Berg, 1987; Kaplan et al., 1987; McKay et al., 1987; Cragg et al., 1988). The present blinded randomised controlled study was designed to assess the pain produced by injection of local anaesthetic agents at room temperature and body temperature in the clinical situation.

Methods

Informed consent was obtained from all patients. Forty patients attending for local anaesthetic procedures on the cheeks and chin were randomly allocated to receive either 1% lignocaine with 1:200,000 adrenaline at body temperature (38°C in the syringe) or at room temperature (18°C, range 17-20°C). Randomisation was performed using prearranged sealed envelopes and the trial was single blinded in that the patient did not know which injection was being used. Each patient received 4 ml of local anaesthetic solution from a 5 ml syringe using a 30 gauge needle; all injections were given by a single operator. Seven patients had two lesions more than 5 cm apart which were classed for the purpose of this study as separate lesions. The second lesion was not randomised but was put into the opposite group to allow direct comparison between the two groups. All injections were given subcutaneously; two patients who received intradermal injections were removed from the study. A standard form of words was used for all patients, to explain the injection and the visual analogue scale. The visual analogue scale used was 15 cm long and the centre point was fixed by the pain of the needle entering the skin. The lignocaine and adrenaline solution was in 20 ml vials (Astra Pharmaceuticals). The vials were warmed by suspending them in a commercially available baby food warmer with a thermostatic temperature control. The room temperature vials were taken from the stock cupboard. The results were measured to the nearest millimetre and analysed using the Mann-Whitney U test.

Results

Thirty-eight patients were available for study with 45 injections of local anaesthetic. There were 22 cases in the room temperature group and 23 in the warm group. The results showed that patients perceived significantly less pain (p < 0.005) (Fig. 1) when injected with local anaesthetic at body temperature.

Figure 1—Visual analogue pain scores for warmed and room temperature local anaesthetic solutions.
We did not analyse the results of the paired data separately as the number of paired lesions was felt to be too small for meaningful analysis.

Discussion

Local anaesthetics are known to produce pain but the cause of this is poorly understood. Rood (1977) stated that the perception of temperature of the injection was least between 20 and 35°, but did not comment on pain. In 1987, Finkel and Berg reported an anecdotal report that warming local anaesthetics to 43°C reduced the pain of injection; however, this was refuted in a small study which showed no difference (Kaplan et al., 1987).

Our study shows that pain resulting from the injection of local anaesthetic solutions can be significantly reduced by warming the local anaesthetic to body temperature. The reason for the decrease in pain is not known but there are several possibilities.

Nerve endings are sensitive to cold, and warming the injection may directly reduce stimulation; alternatively, the warmer injection may increase the rate of onset of the block and inhibit pain transmission before the noxious impulses are fully appreciated. The time till anaesthesia was achieved was not measured in our patients as any difference between the two groups was thought to be too small to reach significance with our sample population size. However, Mehta in 1987 showed that warming bupivacaine for epidural block significantly reduced the time to onset of anaesthesia and improved the block achieved (Mehta et al., 1987). McKay et al. (1987) showed that the pain of injection of local anaesthetic solutions could be significantly reduced by raising the pH with sodium bicarbonate. They postulated that the decrease in pain could be due to a shift from the ionised to non-ionised form, facilitating more rapid diffusion. This would be consistent with our second hypothesis, that if the block occurs fast enough the pain is not appreciated. However, these are still tentative hypotheses and more work is required on the interaction of local anaesthetic agents with nerves before a more definite opinion can be given.

In conclusion, we have clearly shown that warming the local anaesthetic prior to injection significantly reduces the pain perceived by the patient during injection, making the whole procedure more acceptable to patients.

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References


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