Does the warming of local anaesthetic reduce the pain of its injection?

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SUMMARY

One hundred and fifty-seven patients who warranted the injection of local anaesthetic were divided into two groups. One group received local anaesthetic at room temperature (21°C) and the other at body temperature (37°C). The pain resulting from the injection was assessed using a visual analogue scale. There was no significant difference in the level of pain experienced by the two patient groups. It is concluded that no advantage is gained by the warming of local anaesthetic before its administration.

INTRODUCTION

It has been suggested (Bloom *et al.*, 1984; Finkel & Berg 1987; Paul *et al.*, 1988) that the pain of injection resulting from the use of warmed local anaesthetic is less than that from anaesthetic at room temperature. Such studies have used a wide range of temperatures, from 22°C (Paul *et al.*, 1988), to 43°C (Finkel & Berg, 1987). Because of the frequent use of local anaesthetics by accident and emergency departments, and the possible benefits of warming these agents, this suggestion was tested.

PATIENTS AND METHODS

One hundred and fifty-seven consecutive patients of both sexes, aged between 16 and 65, were included and divided into two groups. Even-numbered patients (using the accident and emergency card number) were given room temperature (21°C) lignocaine.

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Odd-numbered patients received lignocaine from ampoules which had been stored in a water bath maintained at 41°C and then removed, opened and drawn up into the syringe immediately prior to injection.

The temperature of 41°C was chosen by the following method: a 5-ml ampoule of lignocaine was warmed to a known temperature in a thermostatically controlled water bath. It was then removed and drawn into a 5-ml syringe using a 0.8 by 40 mm 21-gauge needle. This was changed to a 0.5 by 25 mm 25-gauge needle, the solution immediately squirted over the bulb of a thermometer, and the temperature measured. The procedure was repeated using different temperatures of anaesthetic.

Because of the lower temperature of the needles, syringes, attendants' hands and surrounding air, the temperature of the lignocaine consistently dropped by 4°C between water bath and injection. Anaesthetic kept at 41°C therefore resulted in an injection of lignocaine at 37°C (body temperature).

Digital ring blocks and lacerations for suture were included in the study. In both groups, 1% plain lignocaine was injected at 1 ml per 30 s using a 0.5 by 25 mm, 25-gauge needle.

Ring blocks were performed by injecting from the dorsal surface on each side of the base of the proximal phalanx, and were used for lacerations requiring suture, debridement, removal of foreign bodies and for the reduction of dislocations.

Lacerations were anaesthetized by injecting local anaesthetic through the skin between 0.5 and 1.5 cm from the wound edge on both sides. The volume of injection ranged from 1 to 10 ml.

Immediately after the injection, the patients were asked to rate their discomfort on a 100-mm visual analogue scale, varying from no pain at all (0 mm) to the worst pain ever suffered by that patient (100 mm). Scores were analyzed using a non-parametric Mann-Whitney *U*-test.

Patients were excluded if they had ingested alcohol or analgesic drugs within 4 h of the trial, if their level of consciousness was affected in any way, or if they could not speak English.

RESULTS

There was a 2-mm, or 2%, overall difference in median values on the visual analogue scale between patients receiving warmed lignocaine and those receiving room temperature lignocaine (Table 1). Using the two-tailed Mann-Whitney *U*-test, there was no significant difference between the two groups ($P=0.8$).

Similarly, when analysed separately, there was no significant difference between the two groups in either those receiving ring blocks ($P=0.77$) or those receiving skin infiltration ($P=0.93$).

Variables which may affect the pain experienced during injection, such as age and sex of the patient and volume injected, were comparable in the two groups (Table 2). The site of infiltration was well distributed (Table 3) and the number of ring blocks were comparable in fingers and toes (Table 4).

Table 1 Visual analogue score

	Warmed anaesthetic		Room temperature anaesthetic	
	Median	Range	Median	Range
Ring block	20 (<i>n</i> = 30)	1–73	22 (<i>n</i> = 26)	0–50
Infiltration	16 (<i>n</i> = 47)	0–54	13 (<i>n</i> = 54)	0–100
Total	17 (<i>n</i> = 77)	0–73	19 (<i>n</i> = 80)	0–100

n = number of patients.

Table 2 Age, volume and sex

	Warmed anaesthetic		Room temperature anaesthetic	
	Median	Range	Median	Range
Age (years)	30	16–89	27	14–83
Volume (ml)	3.0	0.5–5.0	3.0	1.0–11.0
Number of males	54	(70%)	58	(72%)
Number of females	23	(30%)	22	(28%)

Table 3 Site for skin infiltration (101 patients)

	Warmed anaesthetic	Room temperature anaesthetic
Scalp	5	11
Face	7	7
Chest	—	2
Arm	9	14
Hand	18	11
Leg	7	8
Foot	1	1
Total	47	54

Table 4 Site of ring block (56 patients)

Finger	19	14
Toe	11	12
Total	30	26

DISCUSSION

Injecting local anaesthetic at 37°C, compared with that at room temperature, did not significantly reduce the pain of injection, either when infiltrating the skin or when undertaking ring blocks.

Paul *et al.* (1988) have showed that injecting 0.5% prilocaine at 37°C reduces the discomfort of Bier's blocks, in comparison with anaesthetic at room temperature, and conclude that prewarmed local anaesthetic solutions cause less discomfort in general. Large volumes (40 ml) of solution were used intravenously, however, and therefore cannot be compared with much smaller doses of subcutaneous solution.

Bloom *et al.* (1984) state that preheating local anaesthetic agents used for retrobulbar and facial nerve injection greatly decreases patient discomfort, although they produced no evidence whatsoever.

Finkel & Berg (1987) suggest that heating lignocaine to 43°C before infiltrative injection for local anaesthesia in arthrography, angiography and other interventional procedures reduces the burning sensation during its administration. Again, there is no objective study.

Other factors, such as needle size, volume used and speed of injection, may affect the pain of injection (Gormley, 1987); however, injecting lignocaine subcutaneously at 37°C, by comparison with that at room temperature, does not.

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