DOUBLE-BLIND COMPARISON OF TOPICAL LIGNOCAINE-PRILOCaine CREAM (EMLA) AND LIGNOCAINE INFILTRATION FOR ARTERIAL CANNULATION IN ADULTS

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SUMMARY

In a double-blind, double-dummy study, the efficacy of topical 5% EMLA cream was compared with that of lignocaine infiltration in alleviating the pain of arterial cannulation. Forty unpremedicated adults were allocated randomly to four groups to receive EMLA cream alone, EMLA and 0.9% saline infiltration, EMLA and 1% lignocaine infiltration or placebo cream and 1% lignocaine infiltration. Following arterial cannulation, pain was assessed by the patient using a visual analogue score and by an independent observer using a four-category verbal rating score. Significantly lower pain scores were observed in all patients receiving EMLA compared with those receiving placebo cream and lignocaine infiltration by both patient (P < 0.01) and observer (P < 0.001) assessments. There were no significant differences between the three EMLA groups.

KEY WORDS
Anaesthetics, local: lignocaine, topical lignocaine–prilocaine.

EMLA 5% has been shown to produce dermal anaesthesia before skin puncture during i.v. cannulation in adults [1, 2] and children [3–5]. Studies have demonstrated that EMLA should be applied for a minimum of 45 min before skin puncture [2]. Any local reactions are of minor nature, transient and resolve without treatment [6].

There have been no double-blind studies on the use of EMLA cream during arterial cannulation, which may be undertaken before induction of anaesthesia or in awake patients in the Intensive Care Unit; infiltration of the skin with lignocaine is the method of analgesia usually chosen. However, infiltration itself may be painful and may not provide adequate analgesia. Premedicated patients may be able to tolerate such manoeuvres but, in the unpremedicated patient, arterial cannulation may be an unpleasant experience.

This study was designed to assess the efficacy of EMLA cream to alleviate the pain of arterial cannulation in unpremedicated adults and to compare its analgesic action with that of infiltration with lignocaine.

METHODS AND RESULTS

Forty adult patients were investigated in the study, for which local Ethics Committee approval had been granted. Neurosurgical patients who would not normally receive premedication, but who required arterial cannulation, were included and informed, written consent was obtained from each. Any patient was excluded with a decreased conscious level or a neurological deficit in the upper limbs.

The patients were allocated randomly to one of four groups: EMLA cream only; EMLA and infiltration of 0.9% saline; EMLA and infiltration of 1% lignocaine; placebo cream and infiltration of 1% lignocaine. At least 60 min before induction of anaesthesia, one of the authors (B.G.) applied either one tube of EMLA or a similar volume of
placebo cream to appropriate patients over both radial arteries and covered it with a Tegaderm (3M) occlusive dressing. E45 cream was used as the placebo and had similar appearances to EMLA when placed under the occlusive dressing.

On arrival of the patient in the anaesthetic room, the occlusive dressings and cream were removed. In those patients who were to receive infiltration, a 2-ml syringe containing either 0.9% saline or 1% lignocaine was prepared and infiltration of the skin carried out using approximately 0.2–0.3 ml of the appropriate agent injected intradermally using a 25-gauge needle. Arterial cannulation using a 20-gauge cannula (Abbocath) was performed 2 min after infiltration or immediately after removal of the cream in the group receiving EMLA only. Following cannulation, a visual analogue scale (VAS) was completed by the patient to quantify the discomfort experienced during the procedure. This was scored also by an independent observer using the following simple four-category verbal rating scale (VRS): 1 = no response from patient; 2 = mild facial grimace; 3 = verbal response; 4 = withdrawal of hand. The operator and observer were common to all patients and neither was aware of the group to which the patient was assigned.

VAS and VRS data were tested using the Kruskal–Wallis one-way analysis of variance by ranks and the Mann–Whitney U test.

The mean (range) age of the patients was 48.3 (22–69) yr; there was no difference in age or sex ratio between the groups.

Figure 1 shows individual patient VAS and VRS data and the mean values for each group. The VAS scores were significantly lower ($P < 0.01$) in the EMLA groups (groups 1–3) than the placebo cream–lignocaine infiltration group (group 4). There was no significant difference between the VAS scores in the three EMLA cream groups. Similarly, the VRS scores in groups 1, 2 and 3 were similar and significantly lower than those in group 4 ($P < 0.001$).

No serious side effects were noted. Mild blanching was observed in eight patients in the EMLA groups and two in the placebo group, but this settled within 30 min in all patients. Erythema related to the occlusive dressing was observed in three patients.

**COMMENT**

In adults, the eutectic mixture of lignocaine and prilocaine bases (EMLA) has been shown to penetrate intact skin [1, 6] and it is used widely for pain-free venepuncture in adults [1, 2] and children [3–5]. This study has demonstrated that EMLA cream is also useful for alleviating pain during arterial cannulation in unpremedicated adults.

Both patient VAS and observer VRS scores were significantly lower in the patients treated with EMLA cream. It has been demonstrated that EMLA was equally as effective as infiltration of lignocaine in alleviating the pain of venepuncture in children [4], but we have shown that, during arterial cannulation in adults, EMLA is more effective than infiltration of lignocaine. There is no obvious explanation for this difference, but fear of needles may cause children to overestimate the pain of cannulation after EMLA cream.

Previous studies have demonstrated that the EMLA becomes effective 45 min after application in adults [2], although 60 min is necessary in children [5]. The cream was applied at least 60 min before cannulation in this study, and good analgesia was obtained in all subjects. Analgesia has been observed for up to 300 min after application [3].

Patients in the EMLA cream groups who also had infiltration of the skin (with either saline or lignocaine) had similar VAS and observer scores, confirming that skin infiltration itself did not contribute to the analgesic effect.

The use of EMLA is associated with minimal side effects [6], and temporary blanching on removal of the dressings is the only problem.
reported regularly. In our study, EMLA cream did not cause any serious skin reactions; blanching which settled within 30 min was noted in only 10 of the 40 patients studied.

Some workers have shown that analgesic premedication has no effect on the pain reported during venepuncture [6], in contrast with other reports [3]. All patients in our study received no premedication and therefore the analgesic effects may be attributed to EMLA cream.

REFERENCES