

CORRESPONDENCE

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Temperature of Propofol Does Not Reduce the Incidence of Injection Pain

To the Editor:—The injection of propofol is often painful. Various methods have been described to reduce the incidence of pain. One such method is related with temperatures of propofol, but the results of the studies¹⁻³ that use this method are controversial.

The current study was approved by the local Medical Ethics Committee, and informed consent was obtained from the patients. The study was conducted in a double-blind manner in which neither the patient nor the physician who performed the pain scores knew the temperatures of the propofol administered. Because the reported incidence of pain after injection of propofol was approximately 86%,⁴ a power analysis showed that 25 patients per group would be needed to show a 50% reduction in the incidence of pain ($\alpha = 0.05$, $\beta = 0.1$). Patients in group I received propofol at room temperature (20°C), those in group II received propofol at 4°C, and those in group III received propofol at 37°C. No patient was premedicated. Propofol was administered through a 22-gauge intravenous cannula on the dorsum of the hand. The first 5 ml was injected at a rate of 1 ml/s, and pain scores were determined during the period from the beginning of the injection to 30 s. Expression of pain by strong vocal response or response accompanied by facial grimacing or withdrawal of arm was scored as severe pain. Verbal expression of pain without grimacing or withdrawal of arm was scored as moderate pain. If the pain was scored as severe or moderate, anesthesia induction was hastened by a more rapid injection of propofol. If severe or moderate pain was not observed within 30 s, the patients were asked whether they had any discomfort in the arms; if they answered "yes," this was scored as mild pain, and if they answered "no," this was scored as no pain. Then those patients who had mild or no pain were injected with propofol unless they went to sleep. One-way analysis of variance and chi-square analysis (using Yates' correction) were used for statistical analysis.

The groups differed neither in age, weight, nor gender distribution. There was no statistically significant difference in the pain scores of the three groups ($P = 0.37$) (table 1). The incidence of clinically unacceptable pain (severe and moderate pain) compared with the incidence of clinically acceptable pain (mild and no pain) was not different among the three groups ($P = 0.26$).

McCrirrik and Hunter¹ think that chemical reactions occur less vigorously at lower temperatures and, in connection with this, some patients may not reach pain threshold levels. If we accept that the comments of McCrirrik and Hunter¹ about the chemical reactions of kininogen hypothesis are true, then propofol administered at 37°C should aggravate this chemical reaction; therefore, the incidence of injection pain would increase rather than diminish. Then how would we explain the results of Fletcher and coworkers³ related with propofol administered at 37°C that reduces the incidence of injection pain? The question may be explained by a probable methodological problem: Klement and Arndt⁵ have shown that there are latencies of pain perception up to 30 s. The incidence of pain during injection may be underestimated if patients go to sleep before 30 s. However, this methodological problem also exists in the report of McCrirrik and

Table 1. Incidence of Pain Scores in Each Group

	Group I 20°C (n = 25)	Group II 4°C (n = 25)	Group III 37°C (n = 25)
None	6 (20)	9 (36)	4 (16)
Mild	4 (20)	6 (24)	6 (24)
Moderate	8 (32)	7 (32)	12 (48)
Severe	7 (28)	3 (8)	3 (12)
Total	25 (100)	25 (100)	25 (100)

Values are number (%).

Hunter¹ because they performed the pain scores within only 10 s. We can not explain the mechanism of injection pain, but we do not agree with the kininogen hypothesis proposed by McCrirrik and Hunter.¹

There are a lot of methods that have been evaluated for controlling the pain of propofol (e.g., local anesthetics). In conclusion, the current study showed that injection of propofol neither at 4°C nor at 37°C reduces injection pain.

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