Anesthesiology
1999; 91:591

Strict Temperature Control Has No Effect on Injection Pain with Propofol

To the Editor:—We read with interest the correspondence of Ozturk *et al.*[1] demonstrating no difference in the incidence of pain felt by patients during the injection of cold, room-temperature, and body-temperature propofol. We were, however, concerned that spontaneous warming of the cold propofol, during the interval from removal from the refrigerator to injection, might have been sufficient to mask any beneficial effects. The authors did not describe how they controlled the temperatures of their injectates. However, in our own pilot studies, we noted that the temperature of refrigerated propofol increased by 3–5°C within a few seconds after the refrigerator door was opened and continued to increase at a rate of 0.5°C per minute thereafter. Similarly, warmed propofol cooled rapidly by 1°C per minute in a 24°C room-temperature environment.

Given these concerns, we repeated the study of Ozturk *et al.* but closely monitored the injectate temperature. The study was approved by our local institutional medical ethics committee and informed consent was obtained from 75 female patients scheduled for surgery. Propofol, at a dose of 2.5 mg/kg, was injected *via* a three-way stopcock attached directly to a cannula in the cephalic vein at a rate of 10 ml in 30 s. Patients were assigned randomly to receive propofol at 25°C, 4°C, or 37°C. Cold propofol syringes were kept on ice, warm syringes were placed in a 40°C water bath (Toray Blood Warmer TM-90; Toray Medical Ltd., Tokyo, Japan), and room-temperature syringes were kept in a beaker. In each patient, three pairs of propofol syringes were prepared (one of each pair was for injection and the other was for each temperature measurement) using a temperature probe (Terumo Finer model CTM-303; Terumo Ltd., Tokyo, Japan) inserted through the cut-off nozzle and fixed to the syringe by adhesive tapes. A pair of syringes was stored in each temperature-controlled storage box with the digital thermometer concealed beneath the operating table. When the temperature had nearly reached the target degree, the person monitoring removed both syringes from the "temperature-controlled box." One syringe was handed to the attending anesthesiologist, who held the piston rod in the hand and then injected the drug. The other syringe was left in the monitor's hand in a similar manner while the contained drug temperature was monitored beneath the table. The injector started to administer propofol when given a signal from the monitor. The patient, the pain assessor, and the author were all blinded. Pain scores during injection were determined as described by Ozturk *et al.*[1]

There were no intergroup differences in age, weight, or elapsed time during manual injection to ensure the injection rate. As intended, the mean values of monitored temperatures during injection were significantly different among the three groups (table 1; $P < 0.0001$ by one-way analysis of variance). There were no differences in the reported pain scores of the groups (table 1; $P = 0.31$ by the Kruskal-Wallis test). There were also no differences in the distribution of pain scores, such as in the incidence of combined moderate and severe pain (table 1; $P = 0.33$ by chi-square analysis).

Table 1. The Actual Temperatures During Injection and Incidence of Pain Scores in Each Group

	Group I (n = 25)	Group II (n = 25)	Group III (n = 25)
Temperature (°C) during injection	24.7 ± 0.5*	4.5 ± 0.4*	36.5 ± 0.3*
Pain scores (%)			
None	6 (24)	0 (0)	4 (16)
Mild	3 (12)	6 (24)	7 (28)
Moderate	11 (44)	15 (60)	12 (48)
Severe	5 (20)	4 (16)	2 (8)
Total (%)	25 (100)	25 (100)	25 (100)

Values of temperature are mean ± SD.

* Significantly different from two other groups ($P < 0.0001$).

The results, like those of Ozturk *et al.*, suggest that the temperature of the propofol during injection is not an important determinant of pain.

Rumiko Uda, M.D., Ph.D.
Instructor
Noriko Kadono, M.D.
Resident
Mikiko Otsuka, M.D., Ph.D.
Assistant Professor
Sachiko Shimizu, M.D.
Staff Anesthesiologist
Hidemaro Mori, M.D., Ph.D.
Professor
Department of Anesthesiology
Osaka Medical College
Takatsuki, Osaka, Japan
ane003@poh.osaka-med.ac.jp

Reference

1. Ozturk E, Izdes S, Babacan A, Kaya K: Temperature of propofol does not reduce the incidence of injection pain. ANESTHESIOLOGY 1998; 89:1041

(Accepted for publication April 14, 1999.)