Propofol, an intravenous (IV) sedative-hypnotic agent, is commonly used for the induction of general anesthesia. It has, however, a substantial potential for causing burning pain at the IV site. Several preinduction pharmacologic agents are used routinely to blunt or diminish this burning sensation. Little is published on the effect of a preinduction dose of propofol for pain reduction. Lidocaine, the most studied agent, is recommended by the manufacturer of propofol as a preinduction agent to minimize this burning sensation. If lidocaine could be eliminated, time and cost savings from decreased use of drug, syringes, needles, and alcohol swabs would be realized.

The purpose of this study was to determine the clinical effectiveness of administering preinduction doses of lidocaine vs propofol for decreasing pain experienced during anesthetic induction with propofol.

Thirty unmedicated patients, ASA physical status I or II, scheduled to undergo general anesthesia for a surgical procedure were included.

Patients were randomly assigned, using a random number chart, to receive 20 mg propofol or 40 mg lidocaine intravenously before entering the operating room suite. A minimum of 30 seconds, but not more than 45 seconds, following the administration of randomized drug with open-flow IV fluid, the induction dose of propofol (2.5 mg/kg) was begun through the same IV site. When one half of the dose had been administered and cleared the tubing by visualization, the patient was asked whether any discomfort was felt in the hand. If the response was yes, the patient was asked to rate the pain as mild, moderate, or severe. Then, the anesthetic process continued normally.

No statistically significant difference occurred in pain prevention between treatment groups. In the lidocaine group, 53% (8/15) of patients were pain-free; in the propofol group, 47% (7/15) were pain-free. However, when pain occurred, it was more likely to be classified as severe by the propofol group, 50% (4/8), compared with the lidocaine group, 14% (1/7).

No difference existed in the ability of propofol or lidocaine to decrease the incidence of pain during an induction dose of propofol. The incidence of severe pain, however, was more frequent in the propofol group. The small number of patients experiencing severe pain precluded statistical analysis. Blunting pain associated with propofol warrants further study.

Key words: Induction, lidocaine, propofol.
**Introduction**

Intravenous (IV) sedative-hypnotic agents have long been used for the induction and maintenance of sedation and anesthesia. The newest of these agents, propofol, has become a mainstay in the drug regimen used by nurse anesthetists in their practice. Use of the drug is based on rapid onset, a short recovery period, and an acceptable cardiovascular profile. Propofol, however, has a substantial potential for causing pain and a burning sensation at the IV site. The incidence is between 3% and 9%. In a review of phase 4 clinical trials, the incidence was reported as 5.2% in 2,813 patients and accounted for half of all reported adverse effects. A literature review of this phenomenon indicated the incidence varied from 5% to 100%. All of these were without pretreatment methods.

The rate of administration and the site of the IV catheter seem to influence the intensity of pain due to propofol. The more distal the site and smaller the vein, the more severe the response to the pain. Both lidocaine and thiopental sodium, given intravenously as preinduction agents, have been used effectively for decreasing pain perception. Pain, a common stressor, inhibits a positive operating room and anesthesia experience by patients undergoing surgical procedures. Pain control is one goal of the nurse anesthetist in the anesthetic process. By administering an appropriate pain-modifying agent before the induction dose of propofol, the nurse anesthetist can exercise primary prevention of pain.

Intravenous lidocaine, a commonly used agent during the anesthetic procedure, is recommended by Zeneca Pharmaceuticals, the propofol manufacturer (now known as AstraZeneca Pharmaceuticals, Wayne, Pa), as an appropriate adjunct to minimize pain associated with propofol administration. Many studies have validated the effectiveness of preinduction lidocaine for decreasing perceived pain during the propofol induction process. The present report is the first report on the effectiveness of pain reduction by propofol given intravenously.

**Materials and methods**

The pilot study was conducted in a 502-bed medical center in northwestern Pennsylvania between December 1996 and February 1997. Data were collected in a same-day surgery setting from regularly scheduled surgical patients. The study group comprised 11 men and 19 women (mean age, 45 years; range, 18-69 years).

These subjects were unmedicated patients classified as ASA physical status I or II scheduled for a surgical procedure with general anesthesia (Table 1). Patients allergic to lidocaine or eggs, those with sensory deficits in the hand or arm in which the IV catheter would be placed, and pregnant patients were excluded. Patients were randomly assigned to 1 of 2 treatment groups using a random numbers table.

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<th>Table 1. Demographic data</th>
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<td>Age, y (range)</td>
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Local institutional review board approval was granted. Informed consent was obtained from all patients while they were in the same-day surgical waiting area. Patients were blinded to their treatment group, while the investigator was not.

While the patient was still in the surgical holding area, a 20-gauge IV catheter was placed in the dorsum of the hand, and Ringer’s solution was started at a “keep vein open” rate. After being positioned on the operating room table with monitoring equipment connected, the patient received an IV dose of 2% lidocaine (2 mL/40 mg) or propofol (2 mL/20 mg) by open-flow IV as specified by randomization. No occlusion of the vein occurred during the administration. After a minimum of 30 seconds, but not more than 45 seconds, an induction dose (2-2.5 mg/kg) of propofol was infused intravenously over 10 to 20 seconds. When half of the dose was administered and cleared the tubing by visualization, subjects were asked if they felt any discomfort in the hand with the IV. If the answer was yes, they were then asked to classify the pain as mild, moderate, or severe. The patient response was recorded. The anesthesia induction process proceeded routinely. Subject responses in the treatment groups were compared by chi-square analysis (alpha level of significance = .05).

**Results**

The incidence of pain in the propofol group (53% [8/15]) vs that in the lidocaine group (47% [7/15]) was not significantly different (P > .05) (Table 2, Figure). The majority of patients in the lidocaine
group who experienced pain classified the pain as moderate (71% [5/7]), while the majority in the propofol group who experienced pain categorized the pain as severe (50% [4/8]) (see Figure).

Discussion

To date, no published studies have analyzed the effectiveness of propofol as a preinduction agent on pain perception of patients receiving an induction dosage of propofol. In the previous clinical experience of one of our anesthesiology personnel, propofol seemed not to cause pain during administration of the predose or induction dose. Because this was an anecdotal observation, a study was designed to test its validity.

In the present study, no significant differences occurred in the overall incidence of pain during an induction dose of propofol when lidocaine or propofol was used as the preinduction agent. However, pain rated as severe occurred more frequently in the propofol group. Although lidocaine repeatedly has been shown to be the most effective agent for blunting propofol-related pain, the effectiveness of propofol in the present study warrants further investigation.

In this era of cost containment, propofol use has potential advantages over lidocaine. If lidocaine were eliminated, preparation time would decrease; extra supplies and medications could be eliminated.

A limitation of the present study is the small sample. The strength is in the relatively simple design, as it could be easily replicated. Subjects were asked only 2 questions. This quick and simple method of evaluation was chosen due to the rapidly changing level of consciousness that the patient experiences during propofol administration. This method also provided for comparison with other studies using similar techniques.

Conclusion

No statistically significant difference existed in the ability of propofol or lidocaine to eliminate the perception of pain during an induction dose of propofol. The incidence of perceived severe pain was greater in subjects in the propofol vs lidocaine group, 50% vs 14%, respectively. However, the small number of subjects experiencing pain precluded statistical analysis. Blunting pain associated with propofol warrants further study.

REFERENCES


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