An oral airway frequently is utilized in maintaining a patent airway. However, a patient must be able to tolerate such an aid. This study suggests that propofol induction is superior to thiopental (Pentothal®) induction in this regard, because it allows for prompt and earlier airway insertion.

Propofol, a phenol derivative, is an ultra-short-acting intravenous and maintenance agent. It features a rapid onset, short duration of action and rapid distribution and elimination, allowing patients to make a quick recovery.

One-hundred fifty-two patients were studied in comparing propofol induction with pentothol induction. Oral airway insertion was attempted in all patients, and tolerance was evaluated.

There was a statistically significant difference between thiopental induction and propofol induction in the non-smoking groups, showing that propofol induction was superior. In the smoking groups, no statistically significant differences were noted.

Manifestations of airway irritability occurred in both groups. However, laryngospasms and respiratory distress occurred only in the pentothol group, with one of these patients requiring intubation.

Patients who have irritable and/or difficult airways may benefit from oral airway insertion that is preceded by propofol induction.

One of the goals of a successful anesthetic is to maintain a patent airway, which can be done most easily by intubation. However, during surgical procedures where intubation is not appropriate, or after extubation, the lips, tongue and epiglottis can cause airway obstruction. This problem usually can be corrected by proper positioning of the head and mandible or by the insertion of an oral or nasal airway. These airways, other foreign bodies, edematous tissues, secretions and spasmogenic agents, such as barbiturates, also can cause laryngospasm, bronchospasm and possible hypoxia.

This study compares thiopental induction and airway tolerance with propofol induction and airway tolerance and is one aspect of an investigation conducted under the auspices of J.P. Payne, MD, former director of the research department of anesthetics at the Royal College of Surgeons, London, England. (Table I.)

Propofol (Diprivan®), a phenol derivative, is an ultra-short-acting intravenous anesthetic induction and maintenance agent presently being reviewed by the FDA. It was developed by Imperial Chemical Industries PLC in Great Britain and has been approved there for anesthetic use for surgical cases lasting less than 90 minutes. The drug has a rapid onset (45-60 seconds) and a short duration of
action (3-5 minutes). Because of propofol's rapid distribution and elimination, patients who receive it make a quick recovery. It has a low incidence of excitatory side effects and is compatible with a range of premedicants, neuromuscular blocking agents and volatile anesthetic agents, as well as with various other anesthetic techniques and agents, including spinal blockade, nitrous oxide and analgesics, such as fentanyl and alfentanil.

**Methodology**

After approval by the hospital ethics committee, 152 patients, predominantly male, ASA I, II and III, age 50 and older, who were scheduled for cystoscopy gave informed consent to randomization of induction agents.

The study protocol randomized induction agents, with a choice of three agents for maintenance of anesthesia. Thiopental always was used with halothane, and propofol was used either with halothane or intermittent propofol. There were 50 patients in the thiopental/halothane group, 52 in the propofol/halothane group and 50 in the propofol/propofol group. These groups were further subdivided into smokers and non-smokers. All were premedicated with 10-20 mg temazepam (a benzodiazepam) by mouth, 30-120 minutes before induction. Vital signs and ECG were monitored throughout the procedure. Blood pressure and heart rate were measured and recorded every minute during induction with an automatic oscillotonometer (Dinamap®). An oximeter (Ohmeda®) was placed on the patient's left ear to measure oxygen saturation (SaO₂). If the patient's ear was pierced for cosmetic purposes, a finger probe would be placed on the patient's left ear to measure SaO₂, as otherwise the SaO₂ measurement would be inaccurate. Patients were not preoxygenated, as per protocol. Induction time was noted, and all IV anesthetics were inserted directly into the vein. If propofol was to be used as a maintenance agent, a 20-gauge angiocath with a heparin lock was used. Both thiopental and propofol were injected over a period of 20 seconds. Oral airways then were inserted and remained in place throughout the procedure until the patient either rejected them independently or was unable to tolerate them. Ease of airway insertion then was determined. The categories were:

1. **Tolerated**—Airway inserted without response from patient.
2. **Not tolerated**—Patient reacted to the airway, necessitating an additional anesthetic dose or removal of airway, with attempted reinsertion made impossible secondary to continued coughing, a precipitous drop in SaO₂, laryngospasm or the necessity for intubation.

**Results**

The average dose of thiopental was 3.9 mg/kg, and the average dose of propofol was 2 mg/kg. Equipotent doses (ED95) of thiopental and propofol were 4 mg/kg and 2.5 mg/kg, respectively. Premedicated patients tended to require less propofol as did patients over the age of 60. Because the goal was to give the most appropriate dose for sleep without causing apnea for greater than 20 seconds, there was a tendency to use less propofol. The thiopental dose remained the same. Apnea occurred in 20% of patients receiving thiopental and 30% of patients receiving propofol, with 100% of both groups considered asleep, as determined by their lack of response to verbal command and loss of eye reflex.

Using a T-test comparison of the two treatment groups, Tables II and III demonstrate no statistically significant differences between smokers receiving propofol/propofol, thiopental/halothane or propofol/halothane (p<0.01). Although observed differences were real (note percentages), the total number of patients was not large enough to state with confidence that the differences represented anything other than normal variation.

However, when comparing non-smokers receiving propofol or thiopental as induction agents,
Discussion

In seeking smokers for the study, pipe and cigar smokers as well as anyone who had smoked any time within the preceding 12 months was designated a "smoker." Also, because of the deleterious effects of laryngospasm, there was a tendency to be overly cautious in introducing airways into patients who had received thiopental, possibly skewing the results of the smoker/thiopental group. However, it was concluded that propofol (Diprivan®), a new IV anesthetic induction/maintenance agent, increases the safety of induction, especially when using an oral airway.

Results suggest that propofol would be useful, particularly in patients whose airways are difficult to maintain because of physical limitations, such as obesity or cervical arthritis. Experience with patients such as these has shown that oral airways are indispensable in maintaining a patent airway, and propofol allows these aids to be used effectively. Outpatients and others who are not premedicated with an anticholinergic and/or narcotic and therefore have a greater propensity for airway irritation, increased salivation and/or laryngospasm also could benefit from propofol induction.

Tables IV and V demonstrate observed differences that are significant statistically (p<0.001). Both propofol groups tolerated oral airway insertion better than did the thiopental/halothane group.

Complications are reported in Table VI. Salivation and cough occurred in both groups, although less frequently in the propofol groups. Hiccups occurred in two patients (2%) in the propofol group and not at all in the thiopental group. No laryngospasms or intubations were found in the propofol groups, while 10% of the thiopental group had laryngospasms, with one patient requiring intubation for respiratory distress.
REFERENCES

AUTHOR
Priscilla Szneke graduated from St. Anselm College, Manchester, New Hampshire, with a BSN in 1977. In 1984, she completed her anesthesiology training at the New England Medical Center School for Nurse Anesthetists, where she remained as clinical and didactic instructor until 1986.

She completed this study in 1987 while doing anesthesia research at St. Peter’s Hospital, London, England, under the auspices of Professor J.P. Payne, MD, director of the research department of anesthetics at the Royal College of Surgeons. Presently, she is a staff nurse anesthetist at Roger Williams Hospital, Providence, Rhode Island.

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