Patient response to laryngeal mask insertion after induction of anaesthesia with propofol or thiopentone

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The response to insertion of the laryngeal mask airway (LMA) following either propofol 2.5 mg · kg^{-1} or thiopentone 5 mg · kg^{-1} was assessed in two groups of patients. The purpose of the study was to ascertain which of these two induction agents provided the better conditions for insertion of the LMA. Anaesthesia was induced by propofol in 35 patients and by thiopentone in 37. Following induction, ventilation was assisted for two minutes using 50% oxygen and nitrous oxide and 2% isoflurane, before insertion of the LMA. The presence of gagging, coughing, laryngospasm and movement was noted and graded. Thiopentone was associated with an adverse response in 76% of patients, compared with propofol in 26% ($P < 0.01$). Gagging, laryngospasm and head movement were more common using thiopentone ($P < 0.01$, $P < 0.05$ and $P < 0.05$ respectively) and in 11% ($P < 0.05$) of the thiopentone group insertion of the LMA was impossible due to inadequate relaxation. We conclude that, using these doses, propofol is superior to thiopentone as an induction agent for insertion of the laryngeal mask airway.

On évalue chez deux groupes de patients la réaction à l'insertion du masque laryngé soit après l'administration de propofol 2,5 mg · kg^{-1} soit de thiopentone 5 mg · kg^{-1}. L'étude vise à déterminer lequel des deux agents procure les meilleures conditions pour l'insertion du masque. L'anesthésie est induite avec du propofol chez 35 patients et du thiopentone chez 37. Après l'induction, la ventilation est assistée avant l'insertion du masque pendant deux minutes avec oxygène 50% dans du protoxyde et isoflurane 2%. La présence de haut-le coeur, toux, laryngospasme et mouvements est enregistrée et cotée. Le thiopentone est associé à au moins un incident chez 76% des patients, comparativement au propofol avec 26% ($P < 0,01$). Le haut-le-cours, laryngospasme et les mouvements de la tête sont plus fréquents avec le thiopentone ($P < 0,01$, $P < 0,05$ et $P < 0,05$ respectivement). Dans 11% des cas où le thiopentone est utilisé, l'insertion du masque laryngé est rendue impossible par manque de relaxation. Nous concluons qu'avec les doses utilisées, le propofol est supérieur au thiopentone comme agent d'induction pour insertion d'un masque laryngé.

Key words
ANAESTHETICS, INTRAVENOUS: propofol, thiopentone;
EQUIPMENT: airway, laryngeal mask.

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The increasing emphasis on day case anaesthesia has led to the greater use of the laryngeal mask airway (LMA) as an alternative to the face mask and in some cases to tracheal intubation. A depolarising muscle relaxant is not necessary for insertion of the LMA thus avoiding succinylcholine-induced muscle pains which is particularly of benefit when early ambulation is important.

A recent editorial in this journal[1] highlighted the problems that can arise following insertion of the LMA in patients who are not adequately anaesthetised. The choice of induction agent is therefore important. In the setting of day case anaesthesia with its emphasis on early ambulation, the newer induction agent propofol, with its short elimination half-life, would appear to be the induction agent of choice.

The aim of this study was to compare the two most commonly used induction agents, thiopentone and propofol, to see which one better facilitated the insertion of the LMA.

Methods

The study received previous approval from the Hospital Ethics Committee. Patients undergoing elective minor plastic or orthopaedic surgery were entered into the study. Both in-patients and day cases were chosen to provide a mix of premedicated and non-premedicated patients. Premedication consisted of diazepam 10 mg *po* 90 min preoperatively. All gave informed consent and were of

TABLE I Demographic details of patients in the study. Weight and age values expressed as mean ±SD

	Propofol	*Thiopentone*
Male	26	23
Female	9	14
Weight (kg)	72 ± 14	67 ± 9
Age (yr)	31 ± 13	33 ± 10

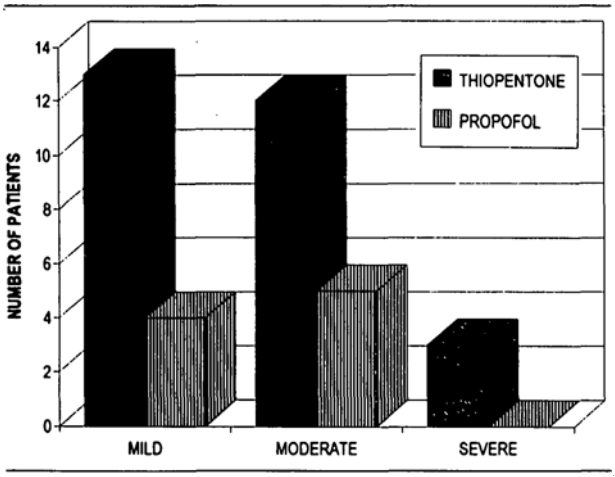

FIGURE Grade of response to laryngeal mask insertion. Only the mild group was significant ($P < 0.05$).

ASA 1 status. Patients with a history of adverse reaction to barbiturates or propofol were excluded from the trial. The patients were randomized to receive either propofol (2.5 $mg \cdot kg^{-1}$) or thiopentone (5 $mg \cdot kg^{-1}$). After induction of anaesthesia, ventilation was assisted for two minutes using 50% oxygen and nitrous oxide and 2% isoflurane before insertion of the LMA. The LMA's were inserted by the most senior member of the study group, who has considerable experience in this technique.

The patient's response to LMA insertion was noted and included the presence or absence of gagging, coughing, limb and head movement and laryngospasm. The response was graded mild, moderate or severe. A mild response settled within 30 sec without intervention. A moderate response meant the patient required an incremental dose of induction agent. This group included those whose muscle relaxation and mouth opening were inadequate to allow insertion of the LMA. A severe response required succinylcholine 25 mg to allow adequate ventilation and oxygenation. The responses were recorded by an anaesthetist who entered the induction room during the two minutes assisted ventilation phase and who therefore was not aware which induction agent had been used.

Statistical analysis was by Chi-square and Student's t test, the 5% level of probability ($P < 0.05$) being taken as significant.

TABLE II Patient response to LMA insertion

	Propofol $n = 35$	*Thiopentone* $n = 37$	*P*
Overall response	9 (26%)	28 (76%)	< 0.01
Head movement	4 (11%)	13 (35%)	< 0.05
Gag reflex	7 (20%)	22 (59%)	< 0.01
Laryngospasm	3 (9%)	11 (30%)	< 0.05
Inadequate relaxation	0 (0%)	4 (11%)	< 0.05
Cough	2 (6%)	7 (19%)	NS
Limb movement	7 (20%)	13 (35%)	NS

TABLE III Incidence of premedication, cigarette smoking and alcohol consumption in both groups

	Propofol $n = 35$	*Thiopentone* $n = 37$	*P*
Premedication	18 (51%)	12 (32%)	NS
Cigarettes	8 (23%)	15 (40%)	NS
Alcohol	17 (48%)	20 (54%)	NS

TABLE IV Influence of premedication, cigarette smoking and alcohol consumption on patients who responded to LMA insertion

	Propofol $n = 9$	*Thiopentone* $n = 28$	*P*
Premedication	2 (22%)	9 (32%)	NS
Cigarettes	1 (11%)	11 (39%)	NS
Alcohol	5 (55%)	15 (53%)	NS

Results

Seventy-two patients entered the study, 35 in the propofol group and 37 in the thiopentone group. There were no differences between the groups with respect to sex, weight and age (Table I). The Figure shows the grade of response and illustrates that no patient in the propofol group required treatment for laryngospasm. Fewer patients (26%) in the propofol group responded to LMA insertion than in the thiopentone group (76%), $P < 0.01$ (Table II). There was less head movement (11%), gagging (20%), and laryngospasm (9%) in the propofol than in the thiopentone group (35% $P < 0.05$, 59% $P < 0.01$, and 30% $P < 0.05$ respectively).

No patient was judged to be inadequately relaxed in the propofol group, and this was less than the 11% in the thiopentone group ($P < 0.05$).

The incidence of premedication, cigarette smoking and alcohol consumption did not differ between the two groups (Table III) and the influence of these variables in patients who responded is shown in Table IV.

Discussion

Smooth insertion of a LMA requires attenuation of air-

way reflexes to avoid sequelae such as gagging, coughing, or laryngospasm. The sequelae can be suppressed by succinylcholine, increased dose of induction agent or narcotics at induction. The problems with these techniques are unpleasant muscle pains following succinylcholine or cardiorespiratory depression and delayed recovery where narcotics or a greater dose of induction agent is given. It is particularly desirable to avoid these in day case anaesthesia.

Therefore, we used an alternative means of attenuating airway reflexes while ensuring rapid recovery and early ambulation. We administered equipotent induction doses[2] of either propofol or thiopentone but delayed insertion of the LMA until the patients had breathed 2% isoflurane for two minutes. This time would approximate with the peak brain concentration of both agents,[3] while the properties of isoflurane ensure rapid uptake and elimination.

Our results show that propofol was the better choice in facilitating LMA insertion. There was less head movement, gagging or laryngospasm in the propofol group and adequate relaxation was better in the propofol group. Previous exposure to smoking and alcohol did not make a difference to these results. Similarly, lack of premedication was not associated with an increase in the number of complications. In similar studies, McKeating *et al.* found that laryngoscopy was easier when propofol was used,[4] while Brown *et al.* found less gagging in response to LMA insertion when propofol was used compared to thiopentone.[5]

In the latter study, all patients who received premedication with diazepam were given fentanyl 1 $\mu g \cdot kg^{-1}$ at induction. Delayed recovery from anaesthesia with these drugs is an undesirable feature of day case anaesthesia. The greater degree of ventilatory depression with propofol[6] and its relative analgesic effect compared with thiopentone[7] may be responsible for the findings presented here and may be sufficient to negate the need for premedication and narcotics before LMA insertion.

The high incidence of adverse responses to LMA insertion following thiopentone suggests that this is an unacceptable induction method if the LMA is used. Adverse responses could be reduced if the dose of thiopentone were increased or if it was supplemented with narcotic. However, this supplementation may be at the cost of increased cardiorespiratory depression and delayed recovery.

The recent editorial on the LMA lists some conditions in which the LMA is unsuitable.[1] We conclude from the evidence presented here that one of these, residual intact upper airway reflexes, can be more easily suppressed when propofol (2.5 $mg \cdot kg^{-1}$) rather than thiopentone (5 $mg \cdot kg^{-1}$) is used as the induction agent and the patient allowed to breathe 50% oxygen/nitrous oxide and 2% isoflurane for two minutes before insertion of the LMA.

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