Tr. J. of Medical Sciences
29 (1999) 319-323

Ahmet Can ŞENEL
Erdem Nail DUMAN
Mevlüt YURTSEVEN
Gönül AKTÜRK

Comparison of Intubation Conditions of Alfentanil and Propofol With Atracurium in Short Procedures of Children

Received: September 16, 1997

Department of Anaesthesia, Farabi Hospital, Faculty of Medicine, Karadeniz Technical University, 61080, Trabzon-Turkey

Abstract: We have assessed tracheal intubating conditions in 45 ASA I-II children, aged 4-14 years undergoing elective ear, nose and throat surgery. After the induction dose of propofol 2.5 $mgkg^{-1}$, group I received alfentanil 10 μgkg^{-1}, group II received alfentanil 20 μgkg^{-1} and group III received atracurium 0.5 mgkg-1 for tracheal intubation.

The mean arterial pressure (MAP), heart rate (HR), arterial oxygen saturation (SaO_2), end tidal carbondioxide (ETCO2) and intubation conditions were investigated. The quality of tracheal intubation was graded according to the ease of laryngoscopy, position of the vocal cords, coughing and jaw relaxation.

There were no significant differences in the overall assessment of intubating conditions between three groups. Intubations were accomplished in 94% of the patients in group I and II, and 100% of the patients in group III.

We conclude that, the combination of propofol and alfentanil improve the adequate conditions for tracheal intubation in children and attenuate the hemodynamic responses to laryngoscopy and tracheal intubation.

Key Words: Anaesthesia; pediatric. Anaesthetics iv; propofol. Analgesics; alfentanil. Intubation; tracheal. Neuromuscular relaxants; atracurium.

Introduction

Pediatric ear, nose and throat surgery cases are short procedures that we meet every day. Suxamethonium is widely used to facilitate tracheal intubation in anaesthesia of these patients. But it has several disadvantages; such as bradycardia, an increase in serum potassium concentration, myalgia and to trigger malignant hiperprexia while the use of atracurium and vecuronium for short procedures delay recovery from anaesthesia. An alternative approach to the use of neuromuscular blockers for tracheal intubation is the use of propofol and alfentanil, to improve intubation conditions (1, 2). This study was designed to compare the intubation conditions and hemodynamic changes in children, with varing doses of alfentanil and atracurium after induction dose of propofol (3, 4, 5).

Materials and Methods

We have investigated 45 ASA I-II children aged between 4-14 years and weighing less than 45 kg, undergoing elective ear, nose and throat surgery. Hospital ethics committee approval and presents informed consent were obtained. All patients were unpremedicated. On arrival in the anaesthetic room, a 22 gauge cannula was inserted into a large forearm vein and electrocardiogram (Hawlett-Packard) and pulse oximeter (Ohmeda 4700 Oxicap) were attached. Measurements of mean arterial pressure (MAP), heart rate (HR) and arterial oxygen saturation (SaO_2) were recorded. Patients were then allocated randomly to three groups to receive one of three doses of: Group I= alfentanil 10 μgkg^{-1}, group II= alfentanil 20 μgkg^{-1} and group III atracurium 0.5 $mgkg^{-1}$. Alfentanil was diluted as 100 μgml^{-1} and atracurium as 0.5 $mgml^{-1}$. After the doses of adjuvans, induction dose of propofol 2.5 $mgkg^{-1}$ was given over 10-15 s. When there was a negative response to verbal stimuli and loss of eye reflex, ventilation was assisted and anaesthesia was maintained with 50% nitrous oxide and 1% halothane in oxygen. After 90 s., intubation was performed with a macintosh laryngoscope blade of appropriate size by the same anaesthetist. MAP, HR and SaO_2 were recorded again after induction, at intubation and 1, 2, 3 minute after intubation. End tidal carbondioxide ($ETCO_2$) was recorded after 1, 2, 3 minute after intubation.

Table 1. Intubating condition score.

	Score 1	2	3	4
Laryngoscopy	Easy	Fair	Difficult	Impossible
Vocal cords	Open	Moving	Closing	Closed
Coughing	None	Slight	Moderate	Severe
Jaw relaxation	Complete	Slight	Stiff	Rigid

Table 2. Patient data table (mean (SD))

	Group I	Group II	Group III
Age(yr)	7.8(2.45)	9.6(2.97)	8.53(2.97)
Weight(kg)	25.4(5.32)	28.47(7.18)	23.6(6.62)
Dose of propofol(mg)	64.74(26.6)	72.67(18.96)	61.0(16.5)

Table 3. Number of patients given each scoring first attempt at intubation.

Group	Score Laryngoscopy				Score Vocal cords				Score Coughing				Score Jaw relaxation			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
I	8	6	0	1	10	3	1	1	6	6	2	1	8	6	0	1
II	10	4	0	1	13	1	1	0	8	6	1	0	10	4	0	1
III	15	0	0	0	14	1	0	0	15	0	0	0	15	0	0	0

The quality of intubation was graded by the consultant using the scoring system devised by Helbo-Hansen, Raulo and Trap-Anderson (Table 1). Ease of laringoscopy, vocal cord position, coughing and jaw relaxation were allocated a score of 1-4.

Intubation conditions were judged acceptable when each individual category score was 2 or less. Any assesment score greater than 2 was taken as indicative of unacceptable conditions. Because of difficult intubation in the position of the larynx, one patient was excluded from the study. Comparison of the three groups was made by the Kruskal-Wallis variance analysis. P<0.001 was regarded as significant.

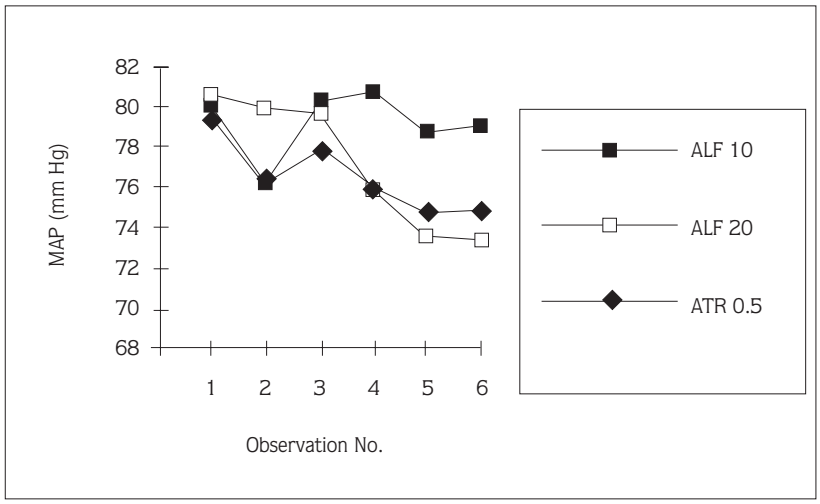
Results

In this study, we investigated 45 children aged between 4-14 years. Groups comprised 15 patients were comparible in age and weight (Table II). The analysis of differences between three groups showed no statistical significance for each variable assessed (p>0.001).

Overall, intubation was accomplished in 94% of the patients in group I and II and there was no statistical significance between two groups (p>0.001). Group III, in which intubation was accomplished in 100% of the patients, was not statistically significant from group I and II (p>0.001) (Table III).

In group I and II there was a small increase in hemodynamic values; MAP and HR but there was not any statistical difference between group I and II (p>0.001). Group III showed no statistical difference as there was a little change in hemodynamic values; MAP and HR (p>0.001) (Figure 1-2).

Changes in SaO_2 and $ETCO_2$ in patients showed no statistical difference in all groups (p>0.001) (Figure 3-4).



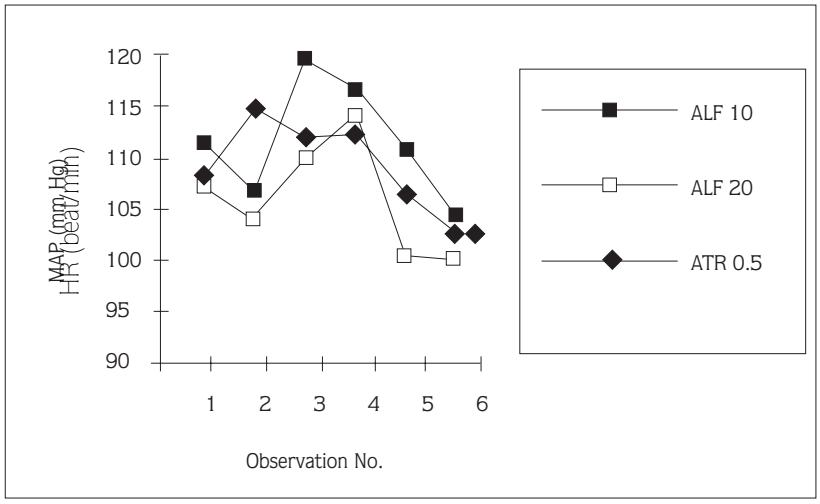


Figure 1-2. Mean changes in MAP and HR in patients in 3 groups. Observations: 1= Baseline; 2= after induction; 3= at intubation; 4-6= 1,2 and 3 min. after intubation.

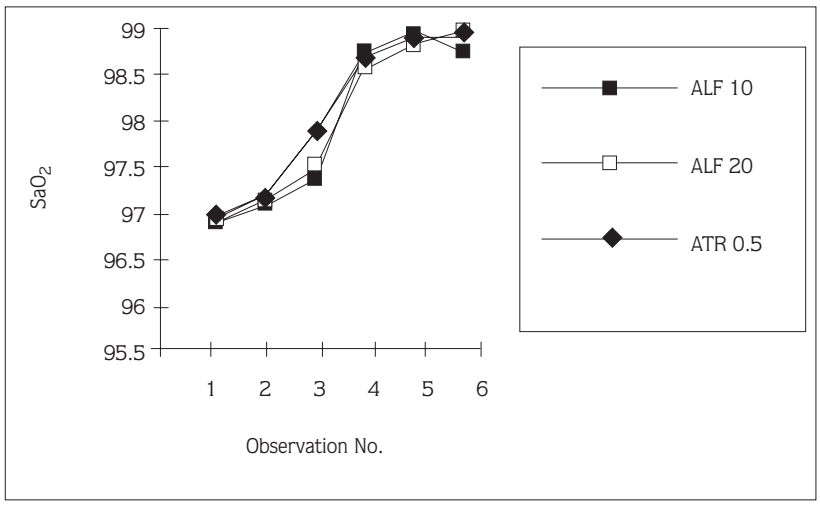
Discussion

In this study we have investigated the potential for tracheal intubation using propofol with alfentanil or atracurium. Atracurium, although of shorter duration than other non depolarizing neuromuscular blockers in clinical use, may delay recovery from anaesthesia after short procedures. On the other hand suxamethonium has well-known side effects. More recent studies in adults have attempted to improve conditions further by the addition of adjuvant agent such as alfentanil (6, 7).

Coghlan et al. showed that conditions for nasotracheal intubation were significantly better when propofol augmented with alfentanil 20 μgkg^{-1}. Jaw relaxation improved, vocal cord movement was reduced and cords were abducted. Pressor reponse to intubation was attenuated (8).

Alcock et al. also studied alfentanil and propofol as an alternative to suxamethonium in facilitating tracheal intubation. Its use was assosiated with a significant decrease in postoperative myalgia without an increase in the frequency of other side effects (9).

In anothar study, McConaghy and Bunting have used aftentanil in doses of 5 μgkg^{-1}, 10 μgkg^{-1}, 15 μgkg^{-1} before the induction dose of propofol. The dose of propofol required to induce anasesthesia decreased significantly with increasing doses of alfentanil. They have shown that adequate conditions for laryngoscopy and intubation were produced in children after induction of anaesthesia with alfentanil 10 μgkg^{-1}, followed by propofol (10). Conditions for intubation were significantly better than those obtained with propofol and alfentanil 5 μgkg^{-1} while no additional benefits were



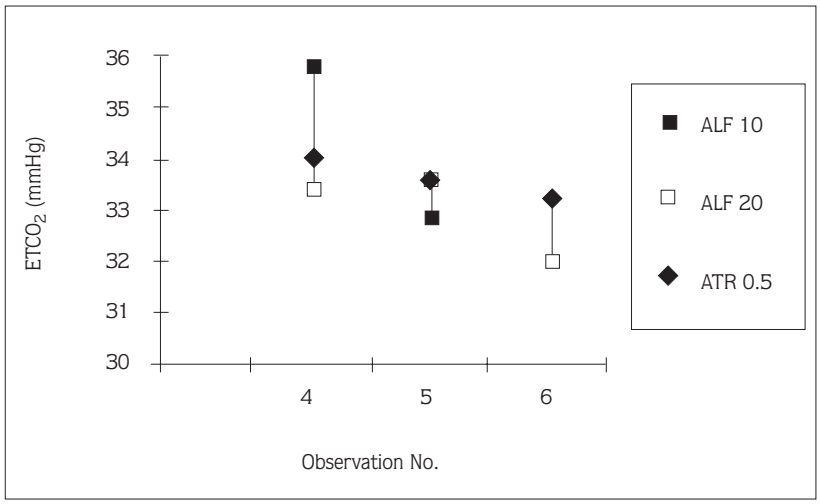


Figure 3-4. Mean changes in SaO2 and ETCO2 in patients in 3 groups. Observations: 1= Baseline; 2= after induction; 3= at intubation; 4-6= 1, 2 and 3 min, after induction.

produced by increasing the dose of alfentanil 15μgkg^{-1}.

Alfentanil, with its rapid onset and short duration of action, may be a logical choice of agent for augmenting propofol for short procedures. It effectively prevents the hemodynamic response to intubation.

In summary, we have shown that in short procedures of children, combination of propofol and alfentanil may be an alternative to neuromuscular agents in improving adequate conditions for tracheal intubation. As the results of group I and II showed no statistical difference, we can prefer the dose of alfentanil 10 μgkg^{-1} as an adjuvan to propofol in the absence of neuromuscular ajents.

References

1. Keaveney JP, Knell PJ. Intubation under induction dose of propofol. Anaesthesia 43 (Suppl.): 80-1, 1988.
2. Jacque JJ, Gold MI, Dehisser EA, Herrington C. Is profol a muscle relaxant? Anesth. Analg. 70 (Suppl.): 172, 1990.
3. Mulholland D, Carlisle RJT. Intubation with propofol augmented with intravenous lignocaine. Anaesthesia 46: 312-13, 1991.
4. Patel DK, Keeling PA, Newman GB, Radfort P. Induction dose of propofol in children. Anaesthesia 43: 949-52, 1988.
5. Hiller A, Saarnivaara L. Injection pain, cardiovascular changes and recorvery following induction of anaesthesia with propofol in combination with alfentanil or lignocaine in children. Acta Anaesthesiol. Scand. 36: 546-68, 1992.

6. Saarnivaara L, Klemola VM. Injection pain, intubating conditions and cardiovascular changes following induction of anaesthesia with propofol alone or in combination with alfentanil. Acta Anaesthesiol. Scand. 35: 19-23, 1991.

7. Davidson JAH, Gillespie JA. Tracheal intubation after induction of anaesthesia with propofol, alfentanil and iv lignocaine. Br. J. Anaest. 70: 163-66, 1993.

8. Couglan SFH, McDonald PF, Csepregi P. Use of alfentanil with propofol for naso tracheal intubation without neuromuscular block. Br. J. Anaest. 70: 89-1, 1993.

9. Alcock R, Peachey T, Lynch M, McEwan T. Comparison of alfentanil with suxamethonium in facilitating nasohracheal intubation in day-case anaesthesia. Br. J. Anaest. 70: 34-7, 1993.

10. McGonaghy P, Buntiny HE. Assessment of intubating conditions in children after induction with prppofol and varing doses of alfentanil. Br. J. Anaest. 73: 596-99, 1994.