TOTAL INTRAVENOUS ANESTHESIA WITH SPONTANEOUS BREATHING FOR TRANSVAGINAL OOCYTE RETRIEVAL

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ABSTRACT

Objective: The aim of this study was to compare the adequacy of spontaneous breathing and assisted ventilation with laryngeal mask airway (LMA) during total intravenous anesthesia for transvaginal oocyte retrieval.

Methods: One hundred patients, undergoing transvaginal oocyte retrieval under propofol - alfentanil anesthesia were randomly assigned into two groups. Anesthesia was induced with 2 $mg.kg^{-1}$ propofol and 10 $\mu g.kg^{-1}$ alfentanil i.v. in all patients . The ventilation was assisted with LMA in group I and was spontaneous in group II. One $mg.kg^{-1}$ propofol and 5 $\mu g.kg^{-1}$ alfentanil i.v. were administered when needed. Systolic and diastolic blood pressure, heart rate, oxygen saturation (SpO_2) and end-tidal CO_2 pressure ($ETCO_2$), total drug doses administered, side effects and Aldrete recovery score were recorded.

Results: Blood pressure and heart rate decreased significantly in all patients after induction ($p<0.001$). SpO_2 increased and $ETCO_2$ decreased significantly at the 5th min in group I. SpO_2 in group I and $ETCO_2$ in group II was found significantly higher ($p<0.001$) but remained within normal range during the operation. There were no differences in the time to achieve an Aldrete recovery score of 10 and the incidence of side effects.

Conclusion: We concluded that propofol-alfentanil anesthesia with spontaneous breathing is an effective and safe anesthetic technique for transvaginal oocyte retrieval.

Key Words: Intravenous anaesthetics, Propofol, Alfentanil, Transvaginal oocyte retrieval

INTRODUCTION

Ultrasound-guided transvaginal follicular aspiration has become the preferred method for in vitro fertilization programmes. It is generally accepted as a painful procedure and there have been several reports on the efficacy and side effects of different anesthetic and analgesic drugs including propofol or thiopental alone (1-3), propofol-fentanil (4), midazolam-remifentanil (4) and midazolam-fentanil (5) in the literature. However, the adequacy of airway management technique and the mode of ventilation during the procedure have not been studied.

The aim of this study was to evaluate the safety of the airway and the adequacy of gas exchange in patients undergoing transvaginal oocyte retrieval under propofol and alfentanil anesthesia without an artificial airway and to compare with the patients whose ventilation was assisted with laryngeal mask airway (LMA).

METHODS

After Faculty Ethic Committee approval and the patients' written consent, 100 female patients,

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ASA I-II and undergoing transvaginal oocyte retrieval, were randomly assigned into two groups (50 patients in each group). No premedication was administered.

Anesthesia was induced with 2 $mg.kg^{-1}$ propofol and 10 $\mu g.kg^{-1}$ alfentanil i.v. in all patients. In group I; an appropriate LMA was inserted and ventilation was assisted to maintain end-tidal CO_2 pressure ($ETCO_2$) between 35-40 mmHg. In group II; the patients were permitted to breathe spontaneously. During anesthesia, 1 $mg.kg^{-1}$ propofol and 5 $\mu g.kg^{-1}$ alfentanil i.v. were administered when needed and all patients were given 100% oxygen. The requirement of alfentanil was determined according to the half-time of the drug and the requirement of propofol was determined according to the clinical signs of inadequate anesthesia such as hypertension, tachycardia, movement or sweating.

In all patients, systolic and diastolic blood pressure, heart rate, oxygen saturation (SpO_2) and in group I, $ETCO_2$ pressure were continuously monitored. In group II, $ETCO_2$ pressure was monitored using a sample line attached at the connection between the breathing circuit and a face mask fitted to the patient's face at 5 minute intervals.

In all patients, before and after induction, systolic and diastolic blood pressure and heart rate SpO_2 and $ETCO_2$ values at were recorded 5 minute intervals. Total propofol and alfentanil doses administered, duration of anesthesia, side effects and the time to achieve an Aldrete recovery score of 10 were also recorded.

The decrease of more than 30% of control values in blood pressure and heart rate were defined as hypotension and bradycardia. Desaturation was defined as a SpO_2 value of less than 95%.

Data are expressed as mean values ± standard deviations (SD). Continuous variables were compared with two-way repeated measures of analyses of variance. Mann Whitney-U test was performed for unpaired data. A $p<0.05$ was accepted as statistically significant.

RESULTS

The two groups were similar with regard to demographic patient characteristics (Table I). Anesthesia duration was found significantly shorter in group I ($p<0.001$) (Table I). Total propofol dose in group II and alfentanil dose in group I was significantly higher (Table I).

In all patients, systolic, diastolic blood pressure and heart rate decreased significantly after induction ($p<0.001$) (Table II). The decrease in diastolic blood pressure and heart rate was significantly higher in group I ($p<0.001$) (Table II). SpO_2 increased and $ETCO_2$ decreased significantly at the 5th min in group I ($p<0.001$). SpO_2 values of group I were significantly higher than those of group II and the $ETCO_2$ values of group II were found to be significantly higher than those of group I ($p<0.001$) although the values were within normal ranges during surgery in all patients (Table III).

Table I: Demographic patient characteristics, duration of anesthesia, total doses of propofol and alfentanil (Mean±SD)

	GROUP I	GROUP II
Age (year)	33.10±6.90	33.08±4.86
Weight (kg)	62.78±8.27	62.34±10.13
Duration of anesthesia (min)	25.70±10.92*	38.70±18.75
Total propofol dose (mg)	199.80±86.13	342.50±11.90*
Total alfentanil dose (μg)	859.00±17.60*	690.20±20.70
*p<0.001		

Table II: Systolic, diastolic blood pressure (mmHg) and heart rate (beat/min) (mean±SD)

	GROUP I		GROUP II	
	Before induction	After induction	Before induction	After induction
Systolic pressure	130.30±17.20	99.50±11.30 *	130.70±15.10	100.90±10.80 *
Diastolic pressure	81.90±11.10	59.60±9.00 * #	81.20±10.40	65.10±9.50 *
Heart rate	94.40±11.90	70.80±12.30 * #	97.20±14.10	88.90±10.90 *
* p< 0.001 intragroup # p< 0.001 between the groups				

Table III: SpO_2 and $ETCO_2$ values (mean±SD)

	SpO_2 (%)		$ETCO_2$ (mmHg)	
	Group I	Group II	Group I	Group II
After induction	97.85±0.60	97.60±0.90	39.20±1.00	39.10±2.00
5. min	99.10±0.50* #	98.40±0.75	34.10±1.10*	38.20±1.90 #
10. min	99.00±0.50* #	98.50±0.60	33.40±2.00*	37.30±2.10 #
15. min	99.00±0.40* #	97.00±0.55	35.10±2.10*	39.10±1.70 #
20. min	99.10±0.45* #	97.90±0.90	36.20±1.70*	40.20±1.60 #
25. min	99.30±0.48* #	97.80±0.85	34.70±2.50*	39.50±2.90 #
30. min	99.10±0.55* #	97.70±0.80	34.60±2.10*	38.70±2.50 #
35. min	99.15±0.60* #	98.40±0.50	35.10±2.15*	39.10±2.00 #

*p<0.001 intragroup

# p< 0.001 between groups

There was no difference in the mean time to achieve an Aldrete recovery score of 10 between the groups (5.3±2.0 and 5.1±1.6 min respectively) (p>0.05).

There was no difference in the incidence and severity of side effects. In group I, hypotension in 3 patients, bradycardia in 9 patients and bronchospasm in 1 patient were observed. In group II, 2 patients had bradycardia. None of the patients required pharmacological therapy.

DISCUSSION

The primary aim of this study was to evaluate whether assisted ventilation with an artificial airway such as LMA or face mask was necessary to obtain efficient gas exchange during intravenous anesthesia proposed in the literature for transvaginal oocyte retrieval. According to the values of SpO_2 and $ETCO_2$ pressure we obtained in spontaneously breathing patients and the clinically unimportant and limited side effects in this group, we suggested that the use of artificial airways such as endotracheal tube, LMA or face mask is not necessary during such procedures.

Ramsewak et al (6) in their study comparing fentanyl and placebo administration to determine the requirement of analgesic agents during transvaginal ultrasound guided follicule aspiration concluded that analgesia is not required during this procedure. Besides it was shown that analgesic and/or anesthetic agents such as halotane, droperidol and fentanyl causing increased plasma prolactin levels and decreased plasma progesterone levels had negative effects on the outcome of in vitro fertilization (7). However, according to the results of numerous studies searching for the appropriate analgesic and anesthetic method for transvaginal oocyte retrieval in the literature, it was generally accepted as a painful procedure (1-5). Therefore the negative effects of pain on the patient and the negative outcome of the fertilization programme should be prevented by the administration an appropriate and minimally invasive anesthetic.

In this study, we did not primarily evaluate the efficacy of propofol-alfentanil anesthesia. There have been several studies evaluating the efficacy of the intravenous anesthetic agents during transvaginal oocyte retrieval in the literature. Propofol and alfentanil have been shown to be appropriate for this outpatient procedure and to be safe regarding the outcome of in vitro fertilization (1-4). Total doses of propofol and alfentanil administered in our study, duration of anesthesia and the incidence and severity of side effects observed were comparable with the results of similar studies (1-3). We thought that shorter duration of anesthesia resulted in a lower total dose of propofol and the presence of an artifical airway necessiated a higher total dose of alfentanil in the LMA group. The shorter duration of anesthesia in group I was thought to be related to the patients' characteristics.

The airway management techniques have specific complications. Although endotracheal intubation is the world-wide accepted gold standard for airway management, it has numerous well-known complications such as hemodynamic stress response, dental and

mucosal injuries, trauma to the larynx, pharynx and esophagus, trauma to the uvula due to the pressure of the tube (8), tongue edema due to pressure or venous obstruction, loss of taste sensation due to pressure of the lingual nerve (9), vocal cord paralysis with misplaced cuff pressure (10), vocal cord granuloma with an incidence of 1/800-1/20000 (11), subglottic edema and tracheal laserations. Although LMA is less invasive than a tracheal tube, its insertion is not without complications. It has been shown that the use of LMA is associated with 10% sore throat as a result of pharyngeal pressure (12), 4% disphagia (13), 12% hoarseness (14), 2% oropharyngeal trauma (15) and trauma to tongue, lingual, recurrent and hypoglossal nerves (16,17). The rate of morbidity with the use of artificial airways leads anesthetists to permit patients to breathe with their physiologic airways whenever it is possible according to the type of surgery and anesthetic technique used.

In our study, the $ETCO_2$ and SpO_2 values of patients breathing spontaneously remained in physiologic limits although they were different from those of the patients ventilated with LMA. These results indicated that the airway was secured and gas exchange was adequate without an artificial airway device.

We concluded that propofol and alfentanil anesthesia can be maintained safely with spontaneous ventilation without an artificial airway during ultrasound-guided transvaginal oocyte retrieval.

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