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The Effects of the Non-Volatile Anaesthetic Agents, Propofol and Thiopental, on Erythrocyte Sedimentation Rate

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Abstract

Objectives. The reduction of erythrocyte sedimentation rate (ESR) induced by general anaesthesia was demonstrated in our previous study. The purpose of the present study was to investigate whether the type of induction agent (propofol or thiopental) used for general anaesthesia had any effects on ESR.

Methods. Sixty-four patients (ASA Physical Status Classification, I-II) scheduled for elective surgery under general anaesthesia were randomly assigned into two groups. In Group I, propofol and in Group II, thiopental were used as induction agents. Two blood samples were obtained before induction and 10 minutes after endotracheal intubation for ESR measurements.

Results. The ESR values of the second samples from both groups were significantly lower than the values of the first samples, but there were no statistically significant differences in ESR values between the values of the two groups.

Conclusion. The results showed that general anaesthesia decreased ESR values regardless of the type of agents being used for induction of anaesthesia. The reason might be related to other drugs used in both groups, or to a common effector mechanism of the two induction agents. The underlying mechanism needs to be investigated.

Introduction

Erythrocyte sedimentation rate (ESR) is determined by erythrocyte morphology, membrane structure and plasma proteins. Anaesthetic agents lead to alterations in membrane permeability, dimension, and physical state [1]. Besides having several effects on electrolyte balance on a cellular level, the effects of anaesthetic agents on ligand-gated ion channels are correlated with anaesthetic potency [2]. The decrease in ESR of patients undergoing intratracheal general anaesthesia was demonstrated in our previous study [3]. We now compared the effects of propofol and thiopental on ESR to investigate whether this decrease was related to the type of intravenous anaesthetic agent used.

Subjects, materials, and methods

Sixty-four patients (American Society of Anesthesiologists Physical Status Classification I–II) undergoing intratracheal general anaesthesia for elective surgical procedures were randomly assigned into two groups. All the patients were premedicated with atropine 0.5 mg and diazepam 10 mg intramuscularly. For induc-

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Table 1. Patients characteristics and the ESR values (mean±SD)

		Group I (n=34)	Group II (n=30)
Gender (M/F)		17/17	20/10
Age		38.4±15.7	36.6±13.0
ESR (mm h^{-1})	Sample 1	15.2±9.3	14.7±10.1
	Sample 2	11.2±7.9*	11.5±8.9*
Difference (mm h^{-1})		4.1±4.3	3.3±2.8
Difference (%)		24.9±23.6	22.9±19.7

* Significantly lower than the values of sample 1 (P<0,001)

tion, in Group I, propofol (2 mg kg^{-1}) and in Group II, thiopental (5–7 mg kg^{-1}) were given intravenously (i.v.). Vecuronium bromide (0.1 mg kg^{-1}) (i.v.) was used as muscle relaxant in both groups. After tracheal intubation, the patients received sevofluorane 2% with nitrous oxide 50% in oxygen. Blood samples were obtained just before induction (sample 1) and 10 minutes after intubation, before surgical incision (sample 2), and collected in the vacuum tubes containing EDTA. The ESR was measured using the Test-1 automated ESR analyzer (Sire Analytic Systems, Udine, Italy) within two hours. In addition, the differences between the two samples of each patient were calculated as mm h^{-1} and percentage (%).

Power analysis revealed that the number of patients in this study was enough to determine the difference of 20%. The results obtained from the two samples of each patient were compared with each other and with the results of the other group, using paired t test and student's t test, respectively. Student's t test was also used to compare the differences between two samples as mm h^{-1} and % in both groups.

Results

Whereas no significant differences were observed in the first and second ESR values between the two groups, the second ESR values were significantly lower than the first values. The differences in mm h^{-1} or percentage (%) between the two measurements were similar in both groups (Table 1). There were no differences between two individual samples of the seven patients in Group I and of the six patients in Group II. In the other 51 patients, the difference ranged from 1 mm h^{-1} to 16 mm h^{-1}. No increase was observed in the second blood samples when compared with the first blood samples.

Discussion

General anaesthesia led to a prominent decrease in ESR values and this decrease was not caused by the type of intravenous anaesthetic agent used (propofol or thio-

pental). Similar ESR values were obtained in both groups. The reason for the similarity between the groups might be related to other drugs used in both groups or to a common effector mechanism of the two agents. The underlying mechanism needs to be explored in experimental studies.

Inflammatory response triggered by surgical stimuli leads to an increase in ESR, which is counteracted by the effects of general anaesthesia. The inflammatory response is mediated by plasma proteins. As a result, different ESR values, affected by general anaesthesia or plasma proteins, will be observed, depending on the time point for sampling. During the postoperative period, the effects of anaesthetic agents decrease because of drug elimination, whereas the effects of plasma proteins increase.

The influence of the change in ESR, especially on microcirculation, should be investigated during the perioperative period during which general anaesthetics have prominent effects, while the effects of plasma proteins are minimal.

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