Assessment of hemodynamic variables during modified electroconvulsive therapy using non-invasive hemodynamic monitor.

Hiroyuki Nakamura, M.D., Mariko Mochidome, M.D., Takashi Ishida, M.D., Satoshi Tanaka, M.D., Mikito Kawamata, M.D.

Department of Anesthesiology and Resuscitology, Shinshu University School of Medicine, Matsumoto, Nagano, Japan

Introduction

Modified electroconvulsive therapy (mECT) is a common therapy for mental illnesses. Although mECT is known to produce increase in mean blood pressure (MBP), little is known about the effect of mECT on cardiac output (CO) and systemic vascular resistance (SVR).^{1), 2)}

The ClearSight System® (Edwards Lifescience co., Irvine, CA, USA: CS) provides continuous non-invasive measurement of hemodynamic parameters including MBP, CO, and SVR. Thus, we used the CS to evaluate the change of hemodynamic variables during mECT under general anesthesia.

Methods

The study protocols were approved by the Institutional Ethics Committee of Shinshu University School of Medicine, Matsumoto, Japan (document number: 3471). Written informed consent was obtained from each patient enrolled in this study. Twenty patients who were scheduled for mECT were included in this study (Figure 1). Exclusion criteria were patients with allergies to Propofol, egg and/or soybean. No premedication was given. After standard monitoring (pulse oximetry, electrocardiogram, and non-invasive arterial pressure) had been started, a finger cuff of CS was placed around the patients' left index finger and CS monitoring was started. MBP, HR, CO, and SVR were continuously measured every 20 seconds by the CS. Central venous pressure was assumed to be 5 mmHg in all patients. After preoxygenation with 100% oxygen, general anesthesia was induced with propofol (1.0 – 2.0 mg/kg), and patients were slightly hyperventilated with oxygen using a face mask. After confirmation of loss of consciousness, a tourniquet around the right arm was pressurized to 250 mmHg to exclude the arm from systemic circulation before administration of succinylcholine. Thereafter, succinylcholine (0.6 – 1.0 mg/kg) was administered. After fasciculation disappeared, face mask ventilation was briefly stopped and mECT stimulus was applied using Thymatron® (Kohden Medical, Tokyo, Japan). Bag-mask ventilation was restarted and continued until the patient resumed spontaneous ventilation.

One-way analysis of variance followed by Holm-Sidak's post hoc test was used for comparisons before mECT stimuli and after mECT stimuli. A p-value less than 0.05 was considered to be significant.

Figure 1. CONSORT flow diagram.

Results

Table 1. Patients' characteristics.

Sex (Female / Male)	14 / 6
Age (years)	65 ± 10
Height (cm)	157 ± 10
Body weight (kg)	47 ± 11
Dose of Propofol (mg/kg)	1.6 ± 0.4
Dose of Succinylcholine (mg/kg)	0.8 ± 0.1
mECT stimulus duration (seconds)	6.8 ± 0.9
Motor seizure duration (seconds)	17.7 ± 15.1

Data are presented as number of patients or means and SDs.

Figure 2. Hemodynamic changes during modified electroconvulsive therapy (mECT). Hemodynamic data were recorded every 20 seconds during mECT. Data are expressed as means and SDs. A, mean blood pressure (MBP) and heart rate (HR). B, systemic vascular resistance (SVR). C, cardiac output (CO). *p < 0.05 vs Pre mECT stimulus; 20 seconds before mECT stimulus.

Conclusions

The CS revealed that mECT induces acute hemodynamic responses. The increase in MBP after mECT is mainly attributed to an increase in SVR.