Target-Controlled Infusion Of Remifentanil Using Orchestratm During Motor Evoked Potential Monitoring.

T Kunisawa, M Oikawa, T Ito, A Kurosawa, S Hanada, Y Goto, H Iwasaki

Citation

T Kunisawa, M Oikawa, T Ito, A Kurosawa, S Hanada, Y Goto, H Iwasaki. *Target-Controlled Infusion Of Remifentanil Using Orchestratm During Motor Evoked Potential Monitoring.*. The Internet Journal of Neuromonitoring. 2008 Volume 6 Number 1.

Abstract

We performed anesthetic management for removal of a brain tumor, during which motor evoked potential (MEP) monitoring was performed. In addition to target-controlled infusion (TCI) of propofol, TCI of remifentanil, which was preinstalled in the Orchestra™, was used for anesthetic induction and maintenance. Remifentanil was administered at the effect-site concentration of 10 g/mL during surgery, and hemodynamics was stable and MEP was well elicited. Since TCI of remifentanil was easily performed by using Orchestra™ and it could provide stable hemodynamics and good conditions for MEP monitoring, Orchestra™ is thought to be suitable for MEP monitoring during craniotomy.

INTRODUCTION

Target-controlled infusion (TCI) of remifentanil can be easily performed using Orchestra™ (Fresenius Kabi, Germany) because Minto's parameter is preinstalled in the Orchestra™ [1, 2]. We performed anesthetic management for removal of a brain tumor, in which motor evoked potential (MEP) monitoring was performed, with TCI of remifentanil using Orchestra™.

CASE DESCRIPTION

The Research Ethics Committee of Asahikawa Medical College approved and monitored the anesthetic management for craniotomy performed using TCI of remifentanil, and we obtained written informed consent from the patient in whom MEP was performed during craniotomy. The patient was a female in her 30s with a height of 159 cm and weight of 50 kg. She had had headache and amnesia for 1 month and was diagnosed with a brain tumor (glioma), for which a surgery was scheduled. In addition to standard monitoring, we performed invasive monitoring of blood pressure (BP) and measured the bispectral index (BIS) value by using the BIS® monitor (Aspect, BIS Monitor A-2000; Nihon Kohden, Tokyo, Japan). TCI of remifentanil was started at the target effect-site concentration (ESC) of 2 ng/mL for 5 min before anesthetic induction by using Orchestra™ with Minto's parameter [1]. Anesthetic induction was performed using TCI of propofol (Diprifusor™; AstraZeneca Pharmaceuticals, Cheshire, UK) at the target plasma concentration (Cp) of 3 g/mL. After loss of consciousness at ESC of propofol of 0.9 g/mL, vecuronium (0.1 mg/kg) was administered to facilitate tracheal intubation, and no additional muscle relaxant was administered. The target concentrations of propofol were adjusted to maintain the BIS value within 40–60 and the target ESC of remifentanil was fixed at 10 ng/mL throughout the surgery. Muscular blockade was reversed with 2.5 mg of neostigmine and 1.0 mg of atropine for MEP monitoring; no effect of the muscle relaxant was confirmed by recovery of train-of-four response before commencing MEP monitoring. MEPs were elicited as same as described in the previous report [3]. The target concentration of propofol was 1.4–1.6 g/mL during surgery. MEP could be elicited throughout MEP monitoring. Two hundred g of fentanyl was injected 70 min before the end of surgery for postoperative pain management. The target concentration of remifentanil was reduced to 2 ng/mL and administration of propofol was stopped at the end of surgery. Extubation could be performed smoothly 8 min after the completion of surgery under administration of remifentanil, when ESC of proporol was 1.0 g/mL, and administration of remifentanil was stopped. Since the hemodynamic parameters were stable, no cardiovascular agent had to be administered. No side effects were observed, and new neurological deficits did not occur.

DISCUSSION

Although TCI of remifentanil is useful for MEP monitoring

during craniotomy, routine use is not easy because of the necessity of a complicated system [3]. However, since the pharmacokinetic parameter is preinstalled in Orchestra™, we can easily use TCI of remifentanil and it is therefore thought to be useful in the field of neurosurgical surgery. In the present case as well, TCI of remifentanil could provide stable hemodynamics during surgery, good conditions for MEP monitoring, and smooth emergence from anesthesia.

ESC of remifentanil of 5 ng/mL has been used during MEP monitoring when MEP was elicited by direct motor cortex stimulation (DMS) [3]. However, we experienced a case in which MEP was elicited well even at the ESC of remifentanil of more than 17 ng/mL [4], and it was thought that remifentanil might offer a wide dosage range for monitoring of MEP which was elicited by DMA as by transcranial electrical stimulation or transcranial magnetic stimulation[5, 6]. Therefore, target ESC of remifentanil was set at 10 ng/mL in the present case. Consequently, MEP was well elicited throughout the MEP monitoring and stable hemodynamics was provided. The present case also indicated that remifentanil offers a wide dosage range for MEP monitoring.

We experienced anesthetic management in which MEP monitoring was performed by means of TCI of remifentanil using Orchestra™. Orchestra™ can easily provide stable hemodynamics and good conditions for MEP monitoring.

References

1. Minto CF, Schnider TW, Egan TD, et al. Influence of age and gender on the pharmacokinetics and pharmacodynamics of remifentanil. I. Model development. Anesthesiology. Jan 1997;86(1):10-23.
2. Kunisawa T, Yamaguchi T, Goto Y, Suzuki A, Takahata O, Iwasaki H. A Case of Anesthetic Management Using OrchestraTM in a Patinet with Myasthenia Gravis. Rinsho masui (Journal of Clinical Anesthesia (Japan)). 2009;33(5):895-897.
3. Kunisawa T, Ito T, Omachi H, et al. [Anesthetic management of a case of craniotomy using TCI of remifentanil with intraoperative monitoring of motor evoked potential]. Masui. Apr 2008;57(4):467-470.
4. Kunisawa T, Oikawa M, Ito T, Kurosawa A, Hanada S, Iwasaki H. A case in which motor evoked potential could be elicited despite an increase in remifentanil dose during craniotomy. The Internet Journal of Neuromonitoring. 2010;In press.
5. Nathan N, Tabaraud F, Lacroix F, et al. Influence of propofol concentrations on multipulse transcranial motor evoked potentials. Br J Anaesth. Oct 2003;91(4):493-497.
6. Hargreaves SJ, Watt JW. Intravenous anaesthesia and repetitive transcranial magnetic stimulation monitoring in spinal column surgery. Br J Anaesth. Jan 2005;94(1):70-73.

Author Information

Takayuki Kunisawa, MD, PhD
Associate Professor, Surgical Operation Department, Asahikawa Medical College Hospital

Mitsuteru Oikawa, MD
Staff Neurosurgeon, Department of Neurosurgery, Nakamura Memorial Hospital

Tamio Ito, MD
Staff Neurosurgeon, Department of Neurosurgery, Nakamura Memorial Hospital

Atsushi Kurosawa, MD
Assistant Professor, Department of Anesthesiology and Critical Care Medicine, Asahikawa Medical College Hospital

Satoshi Hanada, MD
Resident, Department of Anesthesiology, Maimonides Medical Center

Yuya Goto, MD
Clinical Fellow, Department of Anesthesiology and Critical Care Medicine, Asahikawa Medical College Hospital

Hiroshi Iwasaki, MD, PhD
Professor and Chair, Department of Anesthesiology and Critical Care Medicine, Asahikawa Medical College Hospital