Narcolepsy is a chronic condition which is characterized by daytime episodes of undesired episodes of sleep and excessive sleepiness. According to the National Institute of Neurological Disorders and Stroke, it is a neurological disorder in which there is dysfunctional regulation of the sleep-wake cycles (1). There are no guidelines for anesthetizing patients with narcolepsy. This is a case report of the management of such a patient who required general anesthesia.

CASE REPORT

The patient was a 25 year old man, height 180 cm and weight 94 kg, with a history of narcolepsy, who presented for laparoscopic repair of a ventral hernia. He had no other coexisting medical conditions. His treatment consisted of methylphenidate 20 mg twice daily. Despite this medical regimen, he still experienced excessive daytime sleepiness. If sitting quietly in a chair during the day, and unpreoccupied, he would fall asleep. While active, he was able to stay awake. The patient was initially interviewed by the anesthesiologist in the admitting area on the day of surgery. He was sitting up and awake during the conversation. He had not taken methylphenidate on the day of surgery. Following transport to the holding area and placement on a stretcher, he was soon soundly asleep. He awakened upon calling his name. No preoperative sedatives were administered.

Once in the operating room, the standard American Society of Anesthesiologists monitors and the bispectral (BIS) monitor (Aspect Medical Systems, Norwood, MA) were applied. The baseline BIS was 95. Following preoxygenation, general anesthesia (GA) was induced with propofol 200 mg, and muscle relaxation was achieved with vecuronium 10 mg. Fentanyl 100 mcg was also coadministered. GA was maintained initially with isoflurane (ISO) in air/oxygen, with end tidal (ET) ISO concentrations ranging from 0.5 to 0.8%.

Thirty minutes following the induction of anesthesia, the ISO was changed to desflurane (DES). The ET DES ranged from 5.5 to 6.2%. Hemodynamic parameters were stable throughout, and the BIS ranged from 27 to 45 during anesthesia. Ketorolac 30 mg was administered intravenously at the end of surgery, and the surgeon infiltrated the wound with bupivacaine 0.5%. The surgery lasted for 1 hour, 19 minutes. Following completion of the surgery, neuromuscular blockade was antagonized with neostigmine/glycopyrrolate, and the DES was discontinued. The patient woke up promptly, and was extubated 15 minutes after surgery. Within minutes of extubation, he fell asleep, but woke up upon calling his name. His stay in the post anesthesia care unit (PACU) was uneventful. Because of postoperative pain, he received fentanyl 150 mcg and morphine 6 mg in divided doses over 3 hours in the PACU. He was transferred afterwards to a standard hospital room. The postoperative anesthesia visit on post op day (POD) 1 revealed that the patient had no complaints, and did not experience awareness of the anesthesia procedure. He was discharged home on POD 1.

DISCUSSION

There is limited information available on the anesthetic management of patients with narcolepsy. The anesthetic considerations for anesthetizing a patient with narcolepsy are two fold. The first would be possible delayed emergence and post-
operative somnolence. The second would be concern for hemodynamic instability, due to possible interaction between the anesthetics and the agents used to treat narcolepsy.

Burrow et al. (2) published a retrospective study of 10 patients who underwent 27 procedures, and they did not report any cases of prolonged emergence or extended PACU stays. All of those patients were receiving chronic treatment for narcolepsy, and methylphenidate was the most commonly used medication. Propofol was used for induction in 10 cases, and thiopental in the other 17 cases. There was no difference in extinguation time between those two groups. That study did not report the agents used for maintenance of anesthesia, and there was no indication whether electroencephalogram (EEG) monitoring such as the BIS was used.

Pelaez et al. (3) reported the management of a patient with narcolepsy who underwent coronary artery bypass grafting. The patient was anesthetized with an infusion of propofol and remifentanil, which was continued into the postoperative period. Ketorolac 30 mg and propacetamol 2 gm were given postoperatively. The patient was extubated 6 hours following the completion of the surgery.

Mesa et al. (4) reported a patient with narcolepsy who underwent general endotracheal anesthesia with nitrous oxide (N2O), and propofol infusion. She was extubated 15 minutes after surgery, but remained asleep for 1 hour in the PACU. That patient had a history of delayed emergence with prior anesthetics.

Doyle and Wilkinson (5) reported a patient with narcolepsy who underwent GA, and had anesthesia maintained with DES/ N2O. The patient recovered well, and was discharged the same day.

There is limited information on the use of BIS in patients with narcolepsy undergoing anesthesia. In one report, total intravenous general anesthesia was administered utilizing propofol/remifentanil infusions, and the BIS remained stable between 40-60 (6). However, in contrast with the current case report, that patient did not have any attacks of narcolepsy during the last 5 years. The use of BIS was also reported in a patient who was undergoing regional anesthesia with a femoral nerve block, for surgery on the lower extremity (7). In that report, the BIS went through three phases during a narcolepsy-cataplexy episode. First there was a prodromal phase, characterized by intermittent low vigilance. During this prodrome, the BIS fluctuated between high and low values, which was associated with a varying EMG. The second phase revealed continuous low vigilance. In that phase, the BIS remained stable at 75, and there was no EMG activity. The third phase was termed a non-responsive vigilance, and there was no EMG activity. It was a severe narcoleptic attack with loss of muscle tone. The BIS was 45 during this phase, which persisted for about 30 minutes.

Patients with narcolepsy are likely to take medications which may interact with anesthetics. Amphetamines may be utilized, and if so, there may be a depletion of catecholamines, and a reduced ability to generate a sympathetic response to hypotension. Other treatments may include methylphenidate, pemoline, tricyclic antidepressants, and modafinil (3). It has been reported that modafinil, a drug used to promote wakefulness, can improve recovery in patients without narcolepsy following general anesthesia (8). In that study, postoperative alertness and energy was present in 71% of study patients, compared with 18% in the control group. There are currently no recommendations to withhold amphetamines prior to receiving anesthesia, but the anesthesiologist should anticipate possible refractory hypotension, and be prepared to treat with direct acting agents such as phenylephrine and/or epinephrine. An indirect agent such as ephedrine may not be effective in such a situation.

In this case report, a patient with narcolepsy underwent general endotracheal anesthesia with DES, and BIS monitoring. In order to conserve costs, ISO had been initially used while the gas flows were high, but was then switched to DES at lower gas flows. Additional techniques that could be considered to minimize postoperative somnolence include avoiding benzodiazepines, utilization of ketorolac, and infiltration of the wound with local anesthesia. Those techniques were all utilized in the patient reported here. The lower blood/gas-, and fat/blood solubility of DES would seem to make it a preferential choice for patients with narcolepsy. Remifentanil would also be expected to be advantageous, and its use has already been reported (3). The use of BIS may be helpful to guide the administration of the anesthetic. It could also suggest the occurrence or imminent occurrence of a narcolepsy episode, although the use of muscle relaxants would reduce or eliminate an oscillating EMG. There are apparently no publications available of patients with narcolepsy, undergoing general anesthesia with DES and with BIS monitoring. This technique did not result in a delay in emergence. Additional reports are needed to provide more data regarding anesthetizing patients with narcolepsy.
References