Methohexital As Alternative to Propofol for Intravenous Anesthesia in Children Undergoing Daily Radiation Treatment: A Case Report

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AT the Children’s Hospital of Michigan, continuous intravenous propofol is the standard anesthetic for children undergoing multiple daily radiation therapy treatments.

Propofol was chosen because of the rapid induction and usual rapid and smooth emergence. Since September 1994, we have successfully used intravenous propofol in 24 children, aged 13 months to 17 yr, more than 500 times. In two patients, however, severe behavior disturbances were noted during awakening. Intravenous methohexital was a successful alternative anesthetic in both cases.

Case Reports

Case 1

A 4.5-yr-old girl with a posterior fossa astrocytoma required daily radiation therapy treatments in the prone position for 6 weeks after a craniotomy for tumor resection. Intravenous propofol was administered in 2- to 4-mg/kg boluses and maintained with 200 \(\mu\)g·kg\(^{-1}\)·min\(^{-1}\) using a syringe pump, through a percutaneous indwelling central catheter (PICC) line. Duration of the propofol infusion varied from 10-30 min. No additional medications were used in this patient. Oxygen at 2 l/min via nasal cannula was delivered as soon as the patient lost her eyelash reflex. Heart rate, blood pressure, \(SpO_2\), and expired CO\(_2\) were monitored.

The patient did well during her initial treatments, but increasingly aggressive behavior was noted after awakening. This took the form of screaming, kicking, slapping, biting her parents, refusing to get off the stretcher, and refusing to have the pulse oximeter removed from her finger. Typically, she recovered sufficiently in approximately 30 min after propofol was discontinued to be discharged, but in the car on the way home, she was trying to take her clothes off and demanding to return to the Radiation Oncology Center (ROC) to have her “sleeping medicine.” According to her mother, the patient’s behavior returned to normal approximately 45 min after leaving the ROC. Occasionally, at home the patient asked for her “sleeping medicine” before bed. Her parents expressed concern that she may have become addicted to the propofol.

After the fourth treatment with propofol, we attempted to allow the patient to wake up without stimulation in a quiet isolation room. This failed to improve her symptoms. Therefore, after the eighth day of treatment, the anesthetic agent was changed to intravenous methohexital (10 mg/cc). Induction initiated with 1- to 2-mg/kg boluses and maintained with 200 \(\mu\)g·kg\(^{-1}\)·min\(^{-1}\). The patient experienced no side effects during the procedure. The patient woke up pleasantly and was discharged home within 30 min after treatment without any aggressive behavior. This anesthetic was then repeated for an additional 22 treatments, each time without recurrence of her behavior disturbance.

There was no evident difference in discharge time after treatment between intravenous propofol and intravenous methohexital. Parents requested intravenous methohexital sedation 2 months later when she returned for a follow-up magnetic resonance imaging (MRI) evaluation.

Case 2

A 5-yr-old boy with a posterior fossa medulloblastoma required daily radiation treatments in the prone position for 6 weeks and stereotactic radiation treatments in the supine position for 4 days. The first six anesthetics used intravenous propofol, given via a MedPort. 2 to 4-mg/kg intravenous boluses, and were given along with a 200 \(\mu\)g·kg\(^{-1}\)·min\(^{-1}\) maintenance infusion. Equipment, monitoring, and duration of treatment were the same as in the first case described previously. During the first six days of treatment, the patient was increasingly irritable and uncooperative during awakening. The patient screamed, kicked, and hit his mother while leaving the treatment site, and threw objects in the car on the way home for approximately 30 min after leaving the ROC. The mother, a nurse, repeatedly stated that this was not his normal personality.

On the seventh day of treatment, the decision was made to change to intravenous methohexital (1-2 mg/kg intravenous induction boluses and maintained with 200 \(\mu\)g·kg\(^{-1}\)·min\(^{-1}\)). During the remaining 28 treatments, positioning was occasionally disturbed by muscle twitching, but disappeared with deepening of sedation. Also noted were a few episodes of hiccupping with induction, which resolved when he was placed in the prone position. The patient woke up cooperatively and pleasantly without aggressive behavior for the remainder of the treatments. Again, there was no obvious difference in time to discharge.

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Discussion

In more than 500 treatments performed in 24 children, we have found intravenous propofol to be an acceptable drug for maintaining immobility during radiotherapeutic procedures. Previously, we encountered children who were crying, fuzzy, and irritable before and during awakening from intravenous propofol sedation. After a few days, however, these adverse events disappeared, and the children were able to be anesthetized and wake up with their parents and were able to leave the hospital in a short time. However, these two reported patients were different. Their aggressive behavior became worse instead of better. The behavior changes had not been seen with other anesthetics in these two patients, i.e., craniotomy for tumor biopsy and resection and central line insertion. Propofol was the only medication administered for these radiation treatments, and these two patients showed dramatically improved behavior during awakening as soon as we changed from intravenous propofol to intravenous methohexital.

Aggressive behavior while awakening from propofol sedation has not been reported in children previously. In adults, it has been reported of potential abuse behavioral change, mood-altering, and sexual illusion, but not in children.

Pain can occur with injection of propofol, and methohexital if given via peripheral intravenous tube, but both of these patients had central venous access, so this was unlikely to be responsible. Both of these patients had posterior fossa tumors, which might be responsible for their behavior, although we have anesthetized other patients with propofol who also had posterior fossa tumors and who did not display this behavior. However, we cannot rule out a potentiating effect of the tumor on the emergence phenomena.

In conclusion, we noted unusual aggressive personality changes during awakening from propofol sedation in two children undergoing radiation therapy for posterior fossa tumors. Methohexital was a satisfactory alternative sedative drug, without significant side effects or delay in discharge time.

References