Original Articles

Ambulatory Anesthesia for Children Undergoing Laser Treatment

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Abstract

Purpose. Since 1993, we have performed laser surgery for cutaneous lesions, such as simple hemangioma and nevus of Ota, in children under ambulatory anesthesia. Although we anticipate that the numbers of patients treated under ambulatory anesthesia will increase, few reports detail the procedures involved and their perioperative management. We describe this method of anesthesia and discuss its limitations, and future issues.

Methods. To date, we have performed laser treatment on 633 pediatric patients under ambulatory anesthesia. The mean age of the children was 3.6 ± 1.9 years and their mean weight was 16.4 ± 4.7 kg. The lesions treated included simple hemangioma, nevus of Ota, nevus pigmentosus, nevus spilus, and ectopic Mongolian spots. Anesthesia is induced with oxygen, nitrous oxide, and sevoflurane; then an intravenous cannula is inserted under spontaneous respiration. Anesthesia is maintained with assisted ventilation using a mask. Children are not intubated unless a mask cannot be used because the lesion is on the face or back.

Results. No serious peri- or postoperative complications were encountered and there were no serious adverse reactions to anesthesia. With the exception of one child who was admitted overnight for a low-grade fever, all were released from hospital within a few hours.

Conclusion. Ambulatory anesthesia can be performed safely using oxygen, nitrous oxide, and sevoflurane for the laser treatment of cutaneous lesions in pediatric patients.

Key words Ambulatory anesthesia · Laser · Children · Complication

Introduction

When cutaneous lesions, such as port-wine stain (PWS) or nevus of Ota, are treated by laser, adult patients require only local anesthesia; however, we cannot safely perform laser treatment in infants and children using local anesthesia alone.1 For example, facial skin lesions often involve the eyelids, and any sudden movement may result in erroneous laser emission to the conjunctiva or eyeball, and the treatment of larger areas is often traumatic when done in an outpatient clinic under local anesthesia.2 Therefore, laser treatment must be performed on children under general anesthesia. Since 1993, we have been performing laser treatment on children under ambulatory anesthesia on a day-only basis. Parents or guardians bring their child to hospital on the day of treatment, laser treatment is performed in the outpatient clinic under general anesthesia, and the children are allowed to go home after complete emergence from the anesthesia is confirmed. It is generally accepted that more patients will be treated under ambulatory anesthesia, but few studies have been conducted on these procedures and their perioperative management. Thus, we report the details, limitations, and future issues of ambulatory anesthesia.

Patients and Methods

A total of 633 pediatric patients received laser treatment under ambulatory anesthesia at Tokyo Women’s Medical University between April 1993 and March 2001. Informed parental consent was obtained before the procedure, after the risks and benefits had been explained. The patients scheduled for laser treatment under ambulatory anesthesia were limited to those who were, in principle, at least 1 year old, and were either healthy or had a well-controlled systemic disease (Table 1).
The plastic surgeon ordered preoperative laboratory tests and examinations 1 week before the operation. Patients receiving laser treatment for the first time, or those with complications, were examined by a pediatrician. Ambulatory anesthesia was not indicated for children with an acute upper respiratory tract infection, infectious diseases, or diarrhea, or for those at risk of vaccination-related complications. Laser treatment was postponed for patients who met any of the stated criteria (Table 2). All the children were checked for body temperature, diarrhea, skin eruptions, and coughs on the morning of the day of laser treatment. Preoperative oral intake was stopped, depending on the age and body weight of the child (Table 3).

Anesthesia was induced with oxygen, nitrous oxide, and sevoflurane, during which the patients were monitored by digital tip pulse waves and arterial blood oxygen saturation. After the induction, they were also monitored by ECG and automatic sphygmomanometry. An intravenous cannula was inserted under spontaneous respiration. Generally, anesthesia was maintained with assisted ventilation using a mask without intubation; however, if the treatment field was on the face or back, intubation was done for assisted ventilation to maintain anesthesia. When intubation was necessary, the use of a muscle relaxant was avoided whenever possible. In older children, endotracheal intubation was done with 0.1 mg/kg of vecuronium bromide if intubation was difficult with only inhalation anesthesia. Patients treated with the muscle relaxant were given an intravenous injection of a mixture of 0.05 mg/kg neostigmine and 0.025 mg/kg atropine sulfate as an antagonist at the end of the procedure. A Jacson-Rees anesthetic circuit was used for children weighing less than 15 kg, and a semi-closed circuit was used for children weighing 15 kg or more. Anesthesia was maintained with inhalation of nitrous oxide and sevoflurane in oxygen. When the laser treatment was finished, sufficient spontaneous respiration and extremity movements were confirmed, and intubated patients were extubated. Respiratory sounds and oxygen saturation levels were checked and the patients were transferred to the recovery room, located next to the laser treatment room. Patients were

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**Table 1.** Criteria for laser treatment under general anesthesia in children

1. Children must be at least 1 year old
2. Children must be healthy or have a well-controlled systemic disease
3. The laser treatment should be of short duration (less than 90 min, including anesthesia) and minimally invasive
4. The parents (family) should be reliable and willing to follow the pre- and postoperative instructions and understand ambulatory anesthesia
5. Children should be able to arrive at the hospital within 1–1.5 h and reside, or be staying, near a pediatric physician and an emergency pediatric hospital

**Table 2.** Exclusion criteria for laser treatment under ambulatory systemic anesthesia

1. Acute upper respiratory tract inflammation
   The treatment was postponed for 3 to 4 weeks for children with any of the following symptoms: cough, a fever of 37.5°C or higher, pharyngeal flare, or nasal mucus
2. Infectious disease
   The treatment was canceled if a child was confirmed to have been in contact with, or to have contracted, an infectious disease over the past 3 weeks. The treatment was postponed for at least 5 weeks if a child was suspected to have been in contact with, or to have contracted an infectious disease
3. Diarrhea
   The treatment was canceled if the child had diarrhea
4. Vaccination
   The treatment was postponed for at least 4 weeks for children who had received a live vaccination (polio, measles, or BCG)
   The treatment was postponed for at least 2 weeks for children vaccinated with dead bacteria (Japanese B encephalitis, influenza, tuberculin reaction, or pertussis)

**Table 3.** Restrictions of oral intake

1. 6 months–2 years old (body weight <12 kg)
   Food: allowed up until 6 h preoperatively
   Milk: allowed up until 4 h preoperatively
   Water: allowed up until 2.5 h preoperatively
2. 2–3 years old (body weight >12 kg)
   Food: allowed up until the night before surgery
   Milk: allowed up until 6 h preoperatively
   Water: allowed up until 3 h preoperatively
3. 3 years or older
   Food: allowed up until the night before surgery
   Milk: allowed up until 8 h preoperatively
   Water: allowed up until 4 h preoperatively

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