



A survey of dental treatment under general anesthesia in a Korean university hospital pediatric dental clinic

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Background: In South Korea, the number of cases of dental treatment for the disabled is gradually increasing, primarily at regional dental clinics for the disabled. This study investigated pediatric patients at a treatment clinic for the disabled within a university hospital who received dental treatment under general anesthesia. This data could assist those that provide dental treatment for the disabled and guide future treatment directions and new policies.

Methods: This study was a retrospective analysis of 263 cases in which patients received dental treatment under general anesthesia from January 2011 to May 2016. The variables examined were gender, age, reason for anesthesia, type of disability, time under anesthesia, duration of treatment, type of procedure, treatment details, and annual trends in the use of general anesthesia.

Results: Among pediatric patients with disabilities who received dental treatment under general anesthesia, the most prevalent age group was 5-8 years old (124 patients, 47.1%), and the primary reason for administering anesthesia was dental anxiety or phobia. The mean time under anesthesia was 132.7 ± 77.6 min, and the mean duration of treatment was 101.9 ± 71.2 min. The most common type of treatment was restoration, accounting for 158 of the 380 treatments performed.

Conclusions: Due to increasing demand, the number of cases of dental treatment performed under general anesthesia is expected to continue increasing, and it can be a useful method of treatment in patients with dental anxiety or phobia.

Keywords: Disabled children; General anesthesia; Pediatric dentistry; Retrospective studies.

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INTRODUCTION

For very young children or those with a poor ability to cooperate due to a disability, the dental treatment room can be a place of fear where communication is difficult and behavior cannot be controlled. To reduce anxiety and fear in such patients and enable trouble-free treatment for the patient and physician, methods such as general anesthesia or oral, inhaled, or intravenous sedation can

be considered [1,2].

Negative aspects of general anesthesia include the risk of complications, such as airway obstruction or laryngospasm due to the loss of consciousness resulting from suppression of the central nervous system and defensive reflexes, as well as the need for anesthesia equipment and an inpatient room. However, the advantages of general anesthesia are that it does not depend on patient cooperation, has a 100% success rate, reduces the number of hospital visits, and enables expansion of

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the scope of treatment [3].

Children with negative experiences of medical or dental care often become uncooperative patients. With parents increasing participation in decisions regarding the course of treatment, general anesthesia is an important tool as it can minimize psychological stress in an unfamiliar environment [4,5].

Therefore, there has been growing demand for the use of general anesthesia in pediatric patients and patients with disabilities [4,6]. With increasing social understanding and awareness of general anesthesia, the current rate of general anesthesia administration and demographics of patients need to be ascertained.

This study is a retrospective analysis of the demographics and trends of pediatric patients who received dental treatment under general anesthesia at the Chungnam Dental Clinic for the Disabled between January 2011 and May 2016. This data should assist treatment centers that perform dental treatment for patients with disabilities, as well as help to plan future directions for treatment and establish new policies.

MATERIALS AND METHODS

1. Subjects

This study received approval from the institutional review board at Dankook University Dental Hospital (IRB No. DKUDH IRB 2016-09-004). The inclusion criteria included patients: between 1 and 16 years old, and those who visited the Chungnam Dental Clinic for the Disabled, a hospital subsidiary of Dankook University College of Dentistry. A retrospective review and analysis was performed on the treatment records of patients in 236 cases who visited the hospital from January 2011 to May 2016 and received dental treatment under general anesthesia.

2. Methods

General anesthesia was planned at the pediatric dental clinic for outpatients who were incapable of behavioral

control, had a severe disability, or whose behavior could not be controlled by sedation due to extensive treatment and lack of cooperation. After admission on the day of the procedure, the patient's preparedness for anesthesia administration was evaluated, and anesthesia was immediately induced without other pre-treatments. Patients did not change into a hospital gown; their guardian was allowed to stay with them during anesthesia induction and leave the room after loss of consciousness. For pediatric patients and patients with disabilities, anesthesia induction is more problematic than maintenance. Therefore, before venipuncture the anesthesia induction process was sub-classified into four categories according to the patient's degree of cooperation: 1. in patients who cooperated well, an intravenous anesthetic was administered after venipuncture; 2. in cases where persuasion and conciliation were possible, sevoflurane was additionally administered by inhalation following anesthesia induction with nitrous oxide; 3. in cases where persuasion was difficult and there was strong resistance, a high concentration of sevoflurane was administered after placing the patient under physical restraint; 4. in patients who strongly resisted and would not enter the treatment room, mild sedation was first induced with a pre-treatment of midazolam nasal spray before administration of a high concentration of sevoflurane. Following these procedures, a typical general anesthetic protocol was used [3].

We collected the medical records of patients who received dental treatment under general anesthesia by these methods and performed a retrospective analysis of gender, age, reason for anesthesia administration, time under anesthesia, duration of treatment, type of dental procedure performed, and annual trends in the use of anesthesia. Multiple values were allowed to be recorded relating to the reasons for anesthesia administration and the types of procedures that were performed. The number of patients who visited the pediatric dental department for an initial consultation during this period was also investigated in order to calculate the proportion of patients who underwent general anesthesia.

RESULTS

1. Gender

The proportion of males in the study was higher: 176 patients were male (66.9%), and 87 patients were female (33.1%).

2. Age distribution

Patient ages ranged from 1 to 16 years old; 61 patients were 1–4 years old (23.2%), 124 patients were 5–8 years old (47.1%), 68 patients were 9–12 years old (25.9%), and 10 patients were 13–16 years old (3.8%).

3. Time under anesthesia and duration of treatment

The mean time under anesthesia was 132.7 ± 77.6 min, and the mean duration of treatment was 101.9 ± 71.2 min.

4. Type of treatment (Table 1)

Multiple types of treatment performed under general anesthesia were allowed to be included. A total of 380 treatments were performed of which 106 were surgical treatments, 33 were prosthodontic treatments, 158 were

Table 1. Dental treatment

Dental treatment	
Restorative treatment	158
Surgical treatment	106
Endodontic treatment	72
Prosthodontic treatment	33
Oral examination & preventive care	11
Total	380

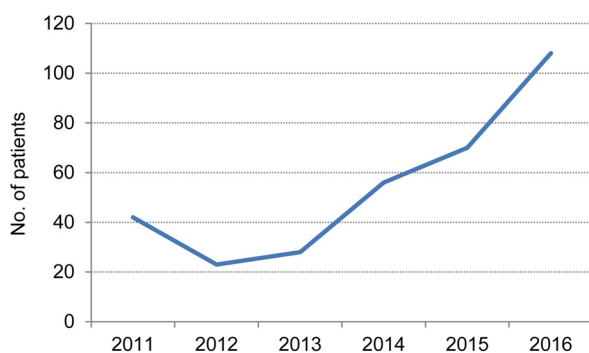


Fig. 1. Annual trend in the number of patients receiving dental treatment under general anesthesia.

restorative treatments, 11 were preventive treatments, and 72 were endodontic treatments. Therefore, the majority of patients underwent restorative or surgical treatments.

5. Annual trends (Fig. 1)

The number of patients who underwent general anesthesia gradually increased from 2011 to May 2016 (values for 2016 were scaled to a year).

6. Reasons for general anesthesia (Table 2)

Multiple reasons for selecting general anesthesia were allowed to be included. These included lack of cooperation due to dental anxiety in 127 patients, mental retardation in 38 patients, lack of cooperation due to age in 29 patients, brain disorder in 29 patients, autism in 26 patients, developmental disability in 18 patients, gag reflex in 10 patients, and physical disability in 6 patients. Other reasons are listed in Table 2.

7. Proportion of patients that underwent general anesthesia

Between January 2011 and May 2016, 15,315 patients visited the pediatric dental clinic for the first time. Of these, 236 patients underwent general anesthesia representing 1.54% of the total population. Additionally, 379 patients underwent sedation during this period representing 2.47% of the total population.

Table 2. Reason for general anesthesia administration

Reason for general anesthesia	
Normal dental anxiety/phobia	127 (43.8%)
Mental retardation	38 (13.1%)
Precooperative	29 (10%)
Brain disorder	29 (10%)
Autism	26 (9%)
Developmental disability	18 (6.2%)
Gag reflex	10 (3.4%)
Physical disability	6 (2.1%)
Asthma	4 (1.4%)
Epilepsy	3 (1%)
Total	290

DISCUSSION

For patients undergoing general anesthesia at a pediatric dental clinic, the majority displayed an impaired ability to cooperate not only due to a medical disability, but also due to anxiety and phobia. It is known that it is difficult to predict compliance in pediatric patients [7,8], and sedation or behavioral induction, such as tell-show-do methods, have been widely used in pediatric dentistry to improve cooperation. Although cooperation can be achieved in most patients even with mild sedation alone, there are limits in applying this method to all patients. Furthermore, patients with disabilities often neglect their oral hygiene over long periods resulting in the need for more extensive treatment, and several rounds of sedation may be required for extensive treatment in pediatric patients. In such cases, general anesthesia may be the best option to enable quality medical care by reducing the number of hospital visits and providing psychological security to the patient, guardian, and dentist [9,10,11].

The number of male patients compared to female patients was higher in this study; there were 176 male patients (66.9%) and 87 female patients (33.1%). Studies by Lee et al. and Seo et al. [12,13] examined gender ratios from long-term domestic statistics and found a similar result, with a 65.3%, 60% ratio of male patients.

The patients' ages were distributed from 1 to 16 years old, and 5–8 years old was the most common age group. These results are similar to findings from a study by Jo et al. in which the most common age group was 5–6 years old, which accounted for 21.5% of the total population [14]. These results are not surprising, since this is an age when children begin to become aware of discoloration occurring in relation to early childhood caries and when guardians become increasingly concerned with a child's appearance.

The duration of treatment time under general anesthesia was 101.9 ± 77.6 min, and the total time under anesthesia was 132.7 ± 71.2 min, which is consistent with findings

from the study by Lee et al [12]. General anesthesia, which enables long treatment times, is preferable to multiple sedation procedures in terms of both time and cost, and it allows treatment to be completed in a single visit without the psychological stress of treatment under restraint [15].

In this study, 380 treatments were performed under general anesthesia in 263 patients: 106 were surgical treatments, 72 were endodontic treatments, 158 were restorative treatments, 11 were preventive treatments, and 33 were prosthodontic treatments. Because general anesthesia enables complete pain control, it is often used for surgical procedures within deeper structures, such as supernumerary tooth extraction, fenestration for orthodontic traction, multiple tooth extraction, and cystectomy, where local anesthesia does not provide sufficient pain control. General anesthesia is also frequently used when restorative, endodontic, and prosthodontic treatments are performed on multiple teeth due to dental caries. This is thought to be because these treatments are performed simultaneously under general anesthesia.

Reasons for choosing general anesthesia included dental anxiety or phobia in 127 patients (43.8%), mental retardation in 38 patients (13.1%), brain disorder in 29 patients (10%), lack of cooperation due to age in 29 patients (10%), autism in 26 patients (9%), and developmental disability in 18 patients (6.2%). These results differ from those from a survey conducted of all age groups at the same clinic where the most common reason for using general anesthesia was mental retardation (45%) [3]. Although general anesthesia was performed due to difficulties with behavioral control in pediatric patients with mental health disorders or disabilities, the ratio of patients who underwent general anesthesia due to dental anxiety, phobia, or a related lack of cooperation was higher than in adult patients [13].

Treatment under general anesthesia cannot be the standard treatment for pediatric patients and patients with disabilities. However, a large number of guardians are selecting general anesthesia based on the child's psychological state, such as dental anxiety or poor coo-

peration, and annual trends show that the relative number of patients choosing general anesthesia is increasing. Furthermore, patients who underwent general anesthesia accounted for 1.54% of all patients visiting the clinic, which is not much lower than the number who underwent sedation (2.47%). This demonstrates that general anesthesia is being performed as an alternative to sedation.

General anesthesia is accompanied by risks, such as laryngospasm or hypoxemia caused by airway obstruction; this risk is even higher in pediatric patients, since they are not able to clearly express their feelings even after recovery from anesthesia. The risk is higher in patients with disabilities, because cooperation is not possible during induction of anesthesia [8]. With an increasing number of pediatric patients demanding high quality dental care [16], it is essential for professional medical teams to perform standardized monitoring during general anesthesia and to be equipped with the proper equipment and facilities to enable a rapid response in an emergency situation.

In conclusion, this study analyzed pediatric patients who received dental treatment under general anesthesia in the last 5 years and found that the demand for general anesthesia is increasing. Moreover, in addition to pediatric patients with disabilities, a large proportion of patients chose general anesthesia due to their psychological state, including dental anxiety and lack of cooperation. In response to these trends, it is important that dental clinics prepare a treatment environment that allows for safe and efficient administration of general anesthesia.

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