



The Effect of Patient-Specific Variables on the Need for Dental Treatment Under General Anesthesia in Children: A Retrospective Study

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ABSTRACT

Aim: For pediatric dentists, meeting the dental treatment needs of young children is often a challenge. Behavioral management techniques may be ineffective in underage children or children with special needs. Therefore, general anesthesia (GA) is required for dental rehabilitation of uncooperative children.

The aim of this study was to examine the patient population treated under General Anesthesia (GA) in terms of age, gender, ASA Score (American Society of Anesthesiologists Physical Status Classification System), duration of anesthesia, duration of operation and the presence of systemic diseases of the patients.

Material and Methods: In this study, 238 patients aged 2-15 years who underwent dental treatment in the General Anesthesia Operating Room of Selçuk University Faculty of Dentistry were included. Patients were divided into 2 groups according to indications for general anesthesia. Medical health status and ASA scores were analysed. Patients were also evaluated according to age, gender, duration of anesthesia and duration of dental treatment.

Results: According to results, the mean age (years) and weight (kg) of the patients were 5.4 and 19.7, respectively. The gender distribution of the patients was 125 female (52.55%) and 113 male (47.5%). The number of ASA I patients was 213 (89.6%) and ASA II patients was 25 (10.5%). In terms of duration of anesthesia, 24 patients were treated in less than 60 minutes (min), 132 patients in 60-120 min and 82 patients in 120-180 min.

Conclusion: Dental treatment operating rooms with inpatient services can serve more different patient groups.

Hastaya Özgü Değişkenlerin Çocuklarda Genel Anestezi Altında Diş Tedavisi İhtiyacına Etkisi: Retrospektif Çalışma

Makale Bilgisi

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ÖZET

Amaç: Çocuk diş hekimleri için küçük çocukların diş tedavi ihtiyaçlarını karşılamak genellikle zorlu bir süreçtir. Davranış yönlendirme teknikleri, küçük yaşlardaki çocuklar veya özel gereksinimli çocuklarda etkisiz olabilmektedir. Bu nedenle, iş birliği yapmayan çocukların diş tedavileri için genel anestezi (GA) gerekmektedir. Bu çalışmanın amacı, GA altında tedavi edilen hasta grubunu yaş, cinsiyet, ASA Skoru (Amerikan Anesteziyologlar Derneği Fiziksel Durum Sınıflandırma Sistemi), anestezi süresi, operasyon süresi ve hastaların sistemik hastalıklarının varlığı açısından incelemektir.

Gereç ve Yöntemler: Bu çalışmaya, Selçuk Üniversitesi Diş Hekimliği Fakültesi Genel Anestezi Ameliyathanesi'nde diş tedavisi yapılan 2-15 yaş arası 238 hasta dahil edilmiştir. Hastalar, genel anestezi endikasyonlarına göre 2 gruba ayrılmıştır. Hastaların tıbbi sağlık durumu ve ASA skorları analiz edilmiştir. Ayrıca, hastalar yaş, cinsiyet, anestezi süresi ve diş tedavi süresi açısından da değerlendirilmiştir.

Bulgular: Sonuçlara göre, hastaların ortalama yaşı (yıl) 5,4 ve ortalama ağırlığı (kg) 19,7 olarak belirlenmiştir. Hastaların cinsiyet dağılımı 125 kadın (%52,55) ve 113 erkek (%47,5) şeklindedir. ASA I grubundaki hasta sayısı 213 (%89,6), ASA II grubundaki hasta sayısı ise 25 (%10,5) olarak kaydedilmiştir. Anestezi süresi açısından bakıldığında, 24 hasta 60 dakikadan kısa, 132 hasta 60-120 dakika ve 82 hasta 120-180 dakika aralığında tedavi edilmiştir.

Sonuç: Bu çalışmanın sonuçlarına göre, hastaların çoğunlukla ASA I sınıfında yer almasının, ameliyathane biriminde günlük genel anestezi hizmeti sunulmasından kaynaklandığı düşünülmektedir. Yataklı servisi bulunan diş tedavisi ameliyathanelerinin ise daha geniş bir hasta grubuna hizmet verebileceği öngörülmektedir.

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INTRODUCTION

Oral and dental diseases are among the health problems that are quite common worldwide. In fact, dental caries are described as one of the most common chronic diseases of childhood, and its prevalence has been reported to increase in children aged 2-5 years in recent times. Dental caries cause functional problems in children, such as chewing and speech disorders, and psychological problems, such as hesitation to smile and speak, negatively affecting the quality of life.^{1,2}

The negative effects of dental caries are not limited to quality of life and oral symptoms. Dental caries in the primary dentition may be associated with malnutrition.³ Children with severe Early Childhood Caries (ECC) have been reported to have poorer diets than those without. Most of these problems that adversely affect health can be prevented or treated at an early stage.⁴

The American Association of Paediatric Dentistry (AAPD) has reported that the treatment of orofacial diseases is medically necessary to prevent pain and infection, to restore the functionality and form of the teeth, and to correct facial profile disorders and dysfunction.⁵

Pediatric dentists should be able to accurately assess the child's reaction to dental treatment according to the level of development and behaviour. Some of the reasons for a child's non-compliance with treatment include general or situational anxieties, inadequate preparation for the appointment, fears during the dental appointment, previous unpleasant dental/medical experience, pain and parental factors.⁶ Children under the age of 6 and those with systemic diseases and/or disabilities can be challenging for pediatric dentists to treat in a clinical setting. In these cases, non-pharmacological behavioral management techniques are prioritized whenever possible.⁷ Behavioural management techniques ensure that most children receive dental treatment with minimal fear and discomfort in a clinical setting. However, when these methods are

ineffective, the option of 'general anesthesia', one of the advanced behavioural management techniques, is considered.

In pediatric dentistry, many factors affect GA indication. Factors influencing the decision between GA and conventional dental treatment include the quality and amount of treatment needed, the child's age, and the child's level of cooperation.⁸

According to the "Behavior Guidance Guide for Pediatric Patients in Dentistry" published by AAPD, the purposes of choosing GA in dentistry include:

- Assisting in treating patients who are at risk mentally, physically, or medically: GA is used to manage and treat children with significant health concerns or disabilities that make traditional dental procedures challenging.

- Relieving anxiety: It helps in alleviating anxiety and fear associated with dental visits, especially in young children or those with prior negative experiences.

- Reducing unwanted behaviors and reactions to dental treatment: GA minimizes disruptive behaviors and reactions that complicate dental procedures, ensuring a smoother treatment process.

- Providing safe, efficient, and effective dental care: It allows dental professionals to deliver high-quality care in a controlled environment, ensuring the safety and comfort of the child.

- Eliminating the patient's response to pain: GA effectively manages and eliminates pain responses, ensuring that the child remains comfortable throughout the procedure.⁹

These objectives underline the importance of general anesthesia in facilitating comprehensive dental care for pediatric patients who might otherwise face significant challenges during dental treatments.

The concept of dental treatment under general anesthesia is the administration of GA to the patient by a team under the responsibility

of an anesthesiologist for various dental procedures.¹⁰ Surgical procedures such as restorative treatments, placed stainless steel crowns, tooth extraction, pulpal treatments (pulpotomy or root canal treatment), as well as labial or lingual frenectomies, odontoma or other benign tumor surgeries of oral soft tissues, removal of cystic lesions, dental auto transplantations, exposure of unerupted teeth with orthodontic approach, are also performed under GA. In addition, minor procedures such as impression, removable or occlusal appliances, and periodontal splints can also be performed under general anesthesia.^{10,11} In a study reporting an increase in the frequency of dental GA in children over the last 10 years, it was noted that there was a rise, particularly in the use of stainless-steel crowns and extraction of deciduous teeth.¹²

The aim of this retrospective study is to examine the general medical health status and demographic properties of our patient population, which is treated under GA in our clinic, and other factors related to the necessity of dental treatment under GA.

MATERIALS AND METHODS

Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Selçuk University, with the decision numbered 2024/09. This study included 238 patients who had previously visited the Pediatric Dentistry Clinic but could not be treated in a clinical setting and who underwent dental treatment under general anesthesia at the General Anesthesia Operating Room of Selçuk University Faculty of Dentistry between

January 1, 2023, and January 1, 2024. The age range of the patients was 2-15 years. The indications for general anesthesia were examined and the patients were divided into 2 groups as healthy/noncooperative patients and patients with mental/physical disability or systemic disease. ASA scores were examined that given to the patients who were evaluated preoperatively by an anesthesiologist. Patients were also evaluated according to age, gender, duration of anesthesia and duration of dental treatment.

Statistical Analysis

Statistical analysis of the study was carried out using IBM SPSS Statistics 21. Shapiro-Wilk test was used to verify the suitability of continuous variables for normal distribution. A statistician evaluated the demographic data in frequency, percentage, mean, and standard deviation (SD). Student t-test and ANOVA were used to test the significance of differences between groups in continuous variables, Pearson's chi-square test was used to test the significance of differences between groups with categorical data and $p < 0.05$ was considered as statistically significant.

RESULTS

According to the data obtained, the mean age of the patients was 5.4 (± 1.8) years, and the mean weight was 19.7 (± 5.9) kg. The gender distribution of the patients was 125 female (52.55%) and 113 male (47.5%). Most patients were ASA I (89%), while the remainder were ASA II (11%). Demographic data of patients are presented in Table 1.

Table 1: Demographic data of patients (n=238)

| SA Status | Number of Patients (n) | ASA II Status | | Sex | |
|-----------|------------------------|----------------|--------------------|------|--------|
| | | Physical | Mental | Male | Female |
| ASA I | 217 | | | 99 | 118 |
| ASA II | 21 | Cardiovascular | | 4 | |
| | | Asthma | | 4 | 2 |
| | | Endocrine | | | 2 |
| | | Hematologic | | | 1 |
| | | | Autism | 3 | 1 |
| | | | Mental Retardation | 2 | |
| | | | Epilepsy | 1 | 1 |

The indication for general anesthesia in all ASA I patients was difficulty in cooperation, whereas in all ASA II patients, it was a systemic disease or special need. In terms of duration of anesthesia, 24 patients were treated in less than 60 minutes (min), 132 patients in 60-120 min, and 82 patients in 120-180 min. (Figure 1) Mean and standard deviation (SD) of the age and weight of patients by the duration of anesthesia and distribution according to anesthesia duration and ASA are shown in Tables 2 and 3.

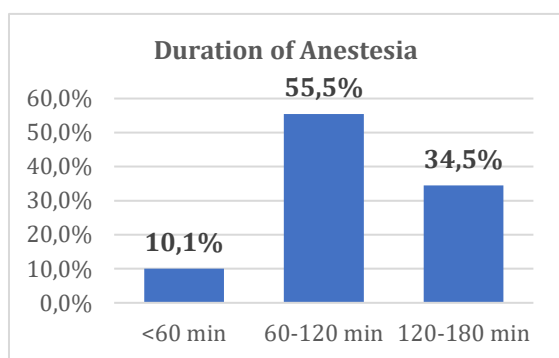


Figure 1: Duration of anesthesia

Table 2: Mean and SD age and weight of patients by the duration of anesthesia

| Duration of Anesthesia | Age (years) | Weight (kg) |
|------------------------|------------------|-------------------|
| <60 min | 6.0 (\pm 1.7) | 23.5 (\pm 5.7) |
| 60-120 min | 5.4 (\pm 1.6) | 19.2 (\pm 4.6) |
| 120-180 min | 5.1 (\pm 2.0) | 19.4 (\pm 7.5) |

Table 3: Patient distribution according to anesthesia duration and ASA status

| ASA Status | Duration of Anesthesia | | |
|------------|------------------------|------------|-------------|
| | <60 min | 60-120 min | 120-180 min |
| ASA I (%) | 9.66 | 49.58 | 30.25 |
| ASA II (%) | 0.42 | 5.88 | 4.20 |
| Total (%) | 10.1 | 55.5 | 34.5 |

DISCUSSION

Dental treatment under GA benefits pediatric patients who require extensive treatment and whose desired results cannot be achieved using local anesthesia and behavioral management. Another population group suitable for this type of treatment is certain physically or mentally disabled patients, often characterized by poor oral hygiene, soft and

cariogenic diets, periodontal disease, and polypharmacy.¹³ This study examined the overall medical and demographic characteristics of the patient population receiving dental treatment under GA in our pedodontics clinic, as well as other factors related to the need for this treatment.

According to our results, the mean age of the patients was 5.4 (\pm 1.8) years, with 89% classified as ASA I and 11% as ASA II ($p < 0.01$). Since most of the patients were noncooperative children, the ASA I rate was found to be high. In patients classified as ASA II, asthma, congenital heart disease and autism were frequently accompanying systemic diseases.

A survey conducted at the pediatric dental clinic of a Korean university hospital found that the most prevalent age group receiving dental treatment under general anesthesia was 5-8 years old (124 patients, 47.1%). The primary reason for administering anesthesia was dental anxiety or phobia.¹⁴ In another study, the patient population consisted of 98 children. Over half of the sample population were males ($n = 61$, 62.2%), and 37 patients were females (37.8%). Patients' ages ranged from 1 to 15 years, with a mean age distribution of 5.4 years and a SD of \pm 2.8 years.¹⁵ Our results are like those of these studies, which also observed a prevalent age group but differed in gender distribution in pediatric dental patients undergoing treatment under general anesthesia. The mean age of the patients was 5.4 (\pm 1.8) years, and the female population ($n=125$) was larger than the male population ($n=113$) in this study.

In a study evaluating the duration of GA in pediatric dentistry, the mean duration of anesthesia was reported to be 97.48 ± 10 min in children under 3 years of age, 101 ± 36 min in children aged 3-6 years, and 105 ± 33 hours in children older than 6 years.¹⁶ In another study, the average time under GA was 132.7 ± 77.6 min, and the mean duration of treatment was

101.9 ± 71.2 min.¹⁴ In this study, 24 patients were treated in less than 60 min, 132 patients in 60-120 min, and 82 patients in 120-180 min.

According to a 2019 study, patients receiving dental general anesthesia were most commonly those with intellectual disabilities, congenital heart disease, and epilepsy.¹⁷ The study sample consisted of 26 (26.5%) ASA II patients and 72 (73.5%) healthy children in another study from the literature.¹⁵ In this study, non-cooperative patients (ASA I) constituted the majority. At the same time, asthma, autism, and congenital heart disease were the most common systemic diseases in the ASA II group of patients, respectively. Most patients classified as ASA I were linked to our clinical acceptance of only day-case patients.

CONCLUSION

Dental treatment under GA is crucial for preventing the distress of multiple visits for pediatric patients with adaptation difficulties or special needs. According to this study's results, most patients were in ASA I class because GA service was provided daily in the operating room unit. Inpatient facilities must provide dental treatment under general anesthesia for higher-risk patient groups from an anesthetic perspective.

Ethical Approval

Ethical approval for the study was obtained from the Non-Interventional Clinical Research Ethics Committee of Selçuk University, with the decision numbered 2024/09.

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Conflict of Interest

The authors deny any conflicts of interest related to this study.

Author Contributions

Design: BMD, FA, Data collection or data entry: FA, Analysis and interpretation: BMD, FA, Literature review: BMD, FA, Writing: BMD.

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