DOI:10.34108/eujhs.1437796

SAĞLIK BİLİMLERİ DERGİSİ
JOURNAL OF HEALTH SCIENCES
Erciyes Üniversitesi Sağlık Bilimleri Enstitüsü Yayın Organıdır

Araştırma 2025; 34(1): 27-33

DENTAL TREATMENT AND ANESTHESIA PROCEDURE IN PEDIATRIC PATIENTS WITH SYSTEMIC DISEASE* SİSTEMİK HASTALIĞI BULUNAN ÇOCUK HASTALARIN DENTAL TEDAVİSİ VE ANESTEZİ PROSEDÜRÜ

Aybüke BAHADIR SEZER[1], Zeynep Aslı GÜÇLÜ[2], Dilek Günay CANPOLAT[3] Seher ORBAY YAŞLI[3]

[1] Department of Pedodontics, Faculty of Dentistry, Nuh Naci Yazgan University, Kayseri, Türkiye
[2]Department of Pedodontics, Faculty of Dentistry, Erciyes University, Kayseri, Türkiye
[3] Department of Maxillofacial Surgery, Faculty of Dentistry, Erciyes University, Kayseri, Türkiye

ABSTRACT

This retrospective study evaluates factors influencing anesthesia selection and procedure duration for children requiring pharmacological behavior management during dental treatment. This retrospective study involved 209 pediatric patients who underwent surgery under general anesthesia and sedation at Erciyes University, Faculty of Dentistry. Health status, age, anesthesia type, procedure time, filling number, and root canal treatment number were recorded. Logistic and linear regressions examined anesthesia type and procedure duration predictors. Increasing the number of fillings (OR (95% CI): 0.857 (0.789-0.931); p<0.001) and the number of root canal treatments (OR (95% CI): 0.546 (0.341-0.873); p=0.012) reduced the likelihood of sedation. In the presence of combined systemic disease, sedation was preferred (OR (95% CI): 45.782 (1.713-1223.446); p=0.023), and the procedure time increased significantly in the presence of mental retardation (p=0.041). Increases in age (p=0.009), number of fillings (p<0.001), and number of root canal treatments (p<0.001) significantly increased the procedure time. The procedure time was significantly shorter in the sedated patients than in the general anesthesia group (p<0.001).Sedation was preferred when combined systemic disease occurred, but general anesthesia was preferred over sedation because the increased number of teeth treated increased the procedure time. The factors affecting the choice of anesthesia and the duration of procedures in pediatric dental treatment are complex; therefore, this study can contribute to create an evidence-based clinical practice guideline based on patient characteristics to improve the safety and treatment outcomes for children.

Keywords: Dental treatment, general anesthesia, pediatric dentistry, sedation in dentistry, special health care need.

ÖZ

Bu retrospektif çalışma, diş tedavisi sırasında farmakolojik davranış yönetimi gerektiren çocuklar için anestezi seçimini ve işlem süresini etkileyen faktörleri değerlendirmektedir. Çalışmaya Erciyes Üniversitesi Diş Hekimliği Fakültesi'nde genel anestezi ve sedasyon altında tedavi edilen 209 çocuk hasta dahil edildi. Sağlık durumu, yaşı, anestezi türü, işlem süresi, dolgu sayısı ve kanal tedavi sayısı kaydedildi. Lojistik ve lineer regresyonlar anestezi tipi ve işlem süresinin belirleyicilerini inceledi. Dolgu sayısının arttırılması (OR (%95 GA): 0.857 (0.789-0.931); p<0.001) ve kök kanal tedavilerinin sayısının arttırılması (OR (%95 GA): 0.546 (0.341 -0.873); p=0.012) sedasyon olasılığını azalttı. Kombine sistemik hastalık varlığında sedasyon tercih edildi (OR (%95 GA): 45.782 (1.713-1223.446); p=0.023), zeka geriliği varlığında işlem süresi anlamlı olarak arttı (p=0.041). Yaş (p=0.009), dolgu sayısı (p<0.001) ve kanal tedavi sayısı (p<0.001) arttıkça işlem süresi anlamlı derecede arttı. Sedasyon uygulanan hastalarda işlem süresi genel anestezi uygulanan gruba göre anlamlı olarak daha kısaydı (p<0.001). Kombine sistemik hastalık oluştuğunda sedasyon tercih edildi ancak tedavi edilen diş sayısının artması işlem süresini arttırdığı için sedasyon yerine genel anestezi tercih edildi. Çocuk hastalarda dental tedavi sürecinde anestezi seçimini etkileyen birçok faktör vardır; bu çalışma çocuklarda işlem güvenliği ve tedavi sonuçlarını iyileştirmek için hazırlanacak hasta özelliklerine dayalı kanıta dayalı klinik uygulama kılavuzu oluşturulmasına katkıda bulunabilir.

Anahtar kelimeler: Diş tedavisi, genel anestezi, çocuk diş hekimliği, diş hekimliğinde sedasyon, özel sağlık bakımı ihtiyacı.

Corresponding Author: Assoc. Prof. Dr. Zeynep Aslı GÜÇLÜ, zaguclu@gmail.com, 0000-0003-0453-0167, Department of Pedodontics, Faculty of Dentistry, Erciyes University, 38039 Melikgazi Kayseri, Türkiye

Authors: PhD. DDS. Aybüke BAHADIR SEZER, bahadiraybuke@gmail.com, 0000-0002-2937-4562
Prof. Dr. Dilek GÜNAY CANPOLAT, dgcanpolat@gmail.com, 0000-0002-8985-6918
Asst. Prof. Dr. Seher ORBAY YAŞLI, syasli@erciyes.edu.tr, 0000-0001-5163-3893

***:** 1st National Symposium on "Ulusal Erciyes Diş Hekimliğinde Anestezi Sempozyumu", April 9, 2022, Kayseri, Türkiye

Makale Geliş Tarihi : 16.02.2024
Makale Kabul Tarihi: 18.02.2025

INTRODUCTION

Dental caries affect general health, causing pain, infection, and malocclusion.[1] The incidence of caries in children with special healthcare needs is higher than that in healthy children.[2] Since these children cannot express themselves, their quality of life decreases, they cannot be fed adequately, and therefore, their general health status is adversely affected.[3, 4] it is essential to prevent caries and treat them, if any, without delay, especially in children with complex diseases.

Dental treatments can be performed cooperatively with appropriate behavioral guidance in most pediatric patients. There are methods that pedodontists can apply according to the cooperation status of pediatric patients. The process, which starts with applying behavioral guidance techniques by adapting them according to the child's capacity, is shaped according to the child's response, either continuing in the clinical setting or leaving its place for the next step, pharmacological techniques.[5] It is difficult to apply behavior management techniques in children who need special health care, such as those with mental, cognitive, auditory, or visual disorders.[4] In these children, pharmacological techniques such as sedation or general anesthesia can be applied to perform treatments safely and efficiently.[4]

Although general anesthesia and sedation procedures are similar, the two applications differ for clinicians. Under general anesthesia, patient consciousness and respiratory functions are entirely removed, and the airway is artificially secured. The need for patient intubation, the presence of muscle relaxants, and the use of narcotic agents at high doses are different aspects of general anesthesia than sedation. Since muscle relaxants are not used during sedation, respiratory functions do not disappear, the patient breathes spontaneously, and the recovery time is shorter. Pulmonary complications are lower when the patient is not intubated.[6] However, since the airway is not controlled artificially, the risk of aspiration increases during dental treatment. The depth of anesthesia during sedation was provided by dose titration of the anesthetic drugs applied.[7] Anesthesia management is conducted with the joint decision of the dentist and anesthesiologist by evaluating the dental and medical needs of the patient. General anesthesia should be administered in full-fledged operating rooms, and sedation should be performed in units with the standards specified in international guidelines.[8]

Several factors play a role in the selection of anesthesia methods, such as the duration of dental treatment, the patient's health status, the medical agents used, age, and the patient's weight.[9] Choosing the appropriate anesthesia method can reduce the risk of complications in the perioperative period.[10] To terminate the anesthetic effect, the drug must be metabolized or eliminated from the body, or the anesthetic effect must be eliminated by another drug.[11]

The objectives of this retrospective study were to (1) determine the effect of age, health factors, and type of dental treatment on the choice of anesthesia type and (2) analyze the effects of age, health factors, type of dental treatment, and anesthesia type on procedure duration.

MATERIALS AND METHODS

Study Design

This study was retrospective in design. Ethical approval was obtained from the Erciyes University Clinical Research Ethics Committee, which reviewed and approved the study procedure. This study was carried out in accordance with the Helsinki Declaration.

Inclusion and Exclusion Criteria

This study was conducted on pediatric patients whose dental treatments were completed under sedation or general anesthesia at the Erciyes University Faculty of Dentistry, Department of Pedodontics. Patients were blinded due to journal recommendations. All patients whose treatments were completed by the same physician between January 2016 and March 2022 and whose medical, restorative, and anesthesia records were complete were included in the study. Patients whose files were missing data regarding general health or anesthesia records were excluded from the study.

General Anesthesia Protocol

After the pre-procedure fasting period, the patients were premedicated and taken to the operating room. Midazolam (0.1 mg/kg) was used for premedication. Propofol (2 mg/kg) and 0, 5-0, 6 mg of rocuronium were used for anesthesia induction. Anesthesia was routinely maintained with sevoflurane. At the end of the procedure, the patients were awakened by antagonizing muscle relaxants. The patients expected to recover were transferred to the inpatient service for further follow-up.

Sedation Protocol

After the pre-procedure fasting period was completed, the patients were premedicated and taken to the operating room. Midazolam (0.1 mg/kg) was used for premedication. Propofol (2 mg/kg) was used for anesthesia induction. The maintenance of anesthesia was continued with intravenous propofol; the patients who recovered after the procedure were then transferred to patient service. In the postoperative period, oral feeding was allowed after one hour in sedated patients and after two hours in patients under general anesthesia. After oral feeding, patients who did not have nausea or vomiting complaints or complications were discharged four to six hours after general anesthesia and two hours after sedation.

Treatment Procedure

The dental procedures applied to the patients included examination, restorative treatment, root canal treatment, tooth extraction, scaling, and polishing. Pediatric patients who could not cooperate with the intraoral examination and dental treatment were evaluated preoperatively, and physical examinations were performed. Laboratory tests were requested. If there are systemic diseases, consultation from related branches is requested. The drugs the patient used regularly were questioned and noted. The patient's history of surgery and, if there were individuals with a family history of anesthesia, whether a complication was encountered were questioned. Considering the data obtained, necessary precautions were taken for each patient. Patients treated with sedation or general anesthesia were fasted for at least 6 hours. After the planned procedures and possible risks were explained, consent forms written in detail with this information were signed by the patients'

legal guardians. The necessary anesthetic agents and methods were applied according to the needs of the patients. Local anesthesia was applied to the teeth of the patients placed under sedation or general anesthesia, and the procedure duration was calculated as the time from the beginning of induction to extubation for general anesthesia. Postoperatively, the patients were taken to the ward after they had left until they recovered.

Data collection and variables

The data were collected from pediatric patient files in the archives of the pedodontics department and electronic patient files integrated into the national personal health record system. The following data were collected: age, sex, weight, general anesthesia type, systemic diseases, extensively used drugs, and the starting and ending times of the procedure for each patient.

The primary outcome of this study was the type of anesthesia. Therefore, for the first purpose, the dependent variable was the type of anesthesia. Anesthesia types were defined as "general anesthesia" or "sedation". Possible predictors of anesthesia type (independent variables) were epilepsy, cerebral palsy, phenylketonuria, kidney disease, mental retardation (MR), autism, respiratory system diseases, developmental anomalies, Down syndrome, gene-chromosome disorder, cleft lip and palate (CL/P), hypothyroidism, cardiac disease, oncological disease, liver transplantation, microcephaly, age, number of filling surfaces, number of root canals treated with endodontic treatment, and presence of systemic disease. The second output of this study is the duration of the procedure. The independent variables affecting the duration of the procedure were statistically analyzed by adding the type of anesthesia to the independent variables affecting the primary outcome.

Statistical analysis

All the data were analyzed using SPSS, version 23 (IBM Corp., New York, United States). The normality of the distribution was evaluated with the Kolmogorov–Smirnov test. The Mann–Whitney U test was used to compare the data that were not normally distributed according to the paired groups. The factors affecting the type of anesthesia were analyzed by binary logistic regression analysis. A linear regression analysis examined the variables affecting the processing time. An F-test was conducted to assess the overall significance of the regression model. The significance level was set at $p<0.050$.

RESULTS

Participants

A total of 209 patients treated under sedation or general anesthesia were included (minimum age, 2 y; maximum age, 14 y). Distribution of patients by anesthesia type and systemic disease status given in Table 1. The mean age did not differ based on the type of anesthesia (p=0.738) (Table 2).

Factors Affecting Sedation

The likelihood of sedation in patients with cerebral palsy within the sedation-treated group was 3.509 times higher (p=0.047). Similarly, the possibility of sedation in patients with genetic chromosomal disorders was 7.149 times higher (p=0.009). The likelihood of sedation in patients with cardiovascular disease (CVD) was 8.811 times greater than that in patients without CVD (p=0.003). As the number of filled surfaces increased, the likelihood of sedation decreased by 0.886 times (p<0.001). As the number of root canal treatments increased, the likelihood of sedation decreased by 0.621 times (p<0.001). The likelihood of sedation was 3.787 times greater in patients with systemic diseases than those without systemic diseases and 18.462 times higher in patients with multiple systemic diseases (p-values0.001 and <0.001, respectively). Patients with multiple systemic diseases were more likely to be treated under sedation. According to the multivariate model, as the number of filled surfaces increased, the likelihood of sedation decreased by 0.857 times (p<0.001). As the number of root canal treatments increased, the likelihood of sedation decreased by 0.546 (p=0.012). The likelihood of sedation in patients with multiple systemic diseases was 45.782 times higher than in patients without systemic diseases (p=0.023). The other variables had no statisti-

Table 1. Distribution of Patients by Anesthesia Type and Systemic Disease Status

Group	Number of Patients	Percentage (%)
Total	209	100
Gender		
Male	117	56
Female	92	44
Type of Anesthesia		
General Anesthesia	166	79.4
Sedation	43	20.6
Systemic Disease Status		
Healthy	133	63.6
Single Systemic Disease	55	26.3
Multiple Systemic Diseases	21	10.1

Table 2. Comparisons by groups

	General anesthesia	Sedation	Test Is.*	p
Age	6.00 (5.00 - 8.00)	6.00 (4.00 - 9.00)	3642.500	0.738

*Mann Whitney U test. Median(Q1 – Q3)

cally significant effect (p>0.050) (Table 3).

Factors Affecting Procedure Duration

The established linear regression model was statistically significant (F=10.943, p<0.001). The independent variables explain 50.3% of the dependent variable in the established linear regression model. In patients who underwent MR, the procedure duration was 22.198 units less than that in patients who did not (p=0.041). With each unit's increase in age, the procedure duration increased by 1.865 units (p=0.009). With each unit increase in the number of filled surfaces, the procedure duration increased by 1.189 units (p<0.001). With each unit's number of root canal treated, the procedure duration increased by 1.642 units (p<0.001). The procedure duration in patients treated with sedation was 19.767 units less than in patients treated with general anesthesia (p<0.001). The procedure time was significantly shorter in the sedated patients than in the general anesthesia group. The other variables had no statistically significant effect (p>0.05) (Table 4).

Findings revealed no significant age difference between those treated under general anesthesia and sedation. Factors influencing sedation included higher likelihoods for patients with cerebral palsy, genetic chromosomal disorders, and cardiovascular diseases. Notably, the increase in filled surfaces and root canal treatments showed a tendency towards decreased sedation likelihood. Patients with systemic diseases, especially multiple systemic diseases, exhibited a notable increase in the possibility of receiving sedation for dental procedures.

In linear regression analysis, the dependent variable should show a normal distribution. The kurtosis and skewness values of the processing time were obtained as 0.657 and 0.223. It was accepted as normal because the kurtosis and skewness values were in the range of ±1. In the established regression model, there should be no multiple connection problems. The multiple connection was examined with VIF values. The VIF values of the independent variables are given in Table 4 and since all VIF values are 10<, there is no multiple connection problem in the regression model. In addition, in order for the model to be valid, the model was obtained significant.

DISCUSSION

This study evaluated patient-related factors affecting the type of anesthesia and the duration of dental treatment under anesthesia. The first of the main results of this study is that sedation is preferred for patients with cardiac diseases, cerebral palsy, or genetic chromosomal disorders, for patients with one systemic disease, and patients with multiple systemic diseases. General anesthesia is preferred when the number of tooth surfaces treated with restorative treatment and root canals treated with endodontic treatment is high. The second main finding is that age, the number of tooth surfaces treated, and the number of root canals increase the duration of the procedure.

Considering the effect of age on the choice of anesthesia type, there is a definite judgment in the literature. In a study in which dental treatments were applied to non cooperative patients under general anesthesia, age ranges were grouped, and it was observed that the sample size was more significant in patients in the 3-6 age range than in patients in the other age groups.[12] In our study, the mean age of the children who underwent dental treatment under sedation and general anesthesia was similar, and no statistically significant difference was found. Each child is evaluated within the framework of their cognitive abilities and characteristics. Still, when we look at the age range of the patients in our sample, the percentage of children aged 2–6 years is high. In the present study, we included children with special needs between 6 and 12, but the sample sizes did not significantly differ. Age was not a determining factor in this study since the age groups usually referred to as general anesthesia or sedation in our clinic were similar. A study examining the methods of meeting the dental treatment needs of patients with autism showed that general anesthesia is preferred over sedation with increasing age, and the difference is statistically signifi-

Table 3. Independent variables affecting sedation were examined by binary logistic regression analysis

	Univariate		Multivariate	
	OR (95% CI)		OR (95% CI)	p
Epilepsy(Reference: none)	2.495 (0.918 - 6.785)	0.073	0.397 (0.036 - 4.408)	0.452
Cerebral Palsy (Ref: none)	3.509 (1.017 - 12.106)	**0.047**	1.262 (0.147 - 10.827)	0.832
Kidney Disease(Reference: none)	3.929 (0.241 - 64.117)	0.337	11.801 (0.165 - 844.346)	0.257
Mr(Reference: none)	0.635 (0.074 - 5.419)	0.678	0.245 (0.006 - 9.768)	0.454
Autism(Reference: none)	2.599 (0.805 - 8.391)	0.110	1.11 (0.121 - 10.23)	0.926
respiratory cyst. Disease(Reference: none)	6.15 (0.994 - 38.043)	0.051	25.483 (0.494 - 1315.769)	0.108
Developmental Anomaly (Reference: none)	3.929 (0.241 - 64.117)	0.337	0.074 (0.002 - 3.006)	0.168
Down Syndrome(Reference: none)	1.976 (0.35 - 11.162)	0.441	0.673 (0.034 - 13.174)	0.794
Gene-Chromosome Disorder(Reference: none)	7.149 (1.637 - 31.226)	**0.009**	1.133 (0.041 - 31.708)	0.941
Hypothyroidism(Reference: none)	4 (0.547 - 29.251)	0.172	0.224 (0.004 - 13.493)	0.475
Cardiac Disease(Reference: none)	8.811 (2.106 - 36.859)	**0.003**	2.513 (0.212 - 29.784)	0.465
Oncological Disease(Reference: none)	4 (0.547 - 29.251)	0.172	2.17 (0.149 - 31.663)	0.571
Age	1.013 (0.901 - 1.139)	0.829	0.85 (0.713 - 1.014)	0.071
Number of fill levels	0.886 (0.841 - 0.933)	**<0.001**	0.857 (0.789 - 0.931)	**<0.001**
Number of Root Canals Treated with Endodontic Treatment	0.621 (0.477 - 0.808)	**<0.001**	0.546 (0.341 - 0.873)	**0.012**
Presence of Systemic Disease (Reference: none)				
There is	3.787 (1.674 - 8.565)	**0.001**	2.162 (0.336 - 13.931)	0.417
Combined	18.462 (6.315 - 53.968)	**<0.001**	45.782 (1.713 - 1223.446)	**0.023**

OR: Odds ratio; CI: Confidence Interval

Table 4. Investigation of independent variables affecting processing time by linear regression analysis

	β0 (95% CI)	β1	t	p	VIF
Constant	30.702 (18.327 - 43.077)		4.895	**<0.001**	
Epilepsy (Reference: none)	-4.016 (-16.927 - 8.896)	-0.035	-0.614	0.540	1.343
Cerebral Palsy (Ref: none)	-12.549 (-29.126 - 4.028)	-0.085	-1.494	0.137	1.336
Phenyl Ketonuria (Reference: none)	-28.522 (-77.173 - 20.129)	-0.060	-1.157	0.249	1.100
Kidney Disease (Reference: none)	-11.603 (-46.496 - 23.291)	-0.034	-0.656	0.513	1.126
Mr (Reference: none)	-22.198 (-43.509 - -0.887)	-0.121	-2.055	**0.041**	1.434
Autism (Reference: none)	-7.859 (-24.446 - 8.728)	-0.057	-0.935	0.351	1.565
respiratory cyst. Disease (Reference: none)	-23.228 (-48.991 - 2.535)	-0.107	-1.779	0.077	1.512
Developmental Anomaly (Reference: none)	1.66 (-33.076 - 36.395)	0.005	0.094	0.925	1.116
Down Syndrome (Reference: none)	-16.71 (-39.295 - 5.875)	-0.084	-1.460	0.146	1.387
Gene-Chromosome Disorder (Reference: none)	-1.738 (-20.678 - 17.201)	-0.010	-0.181	0.857	1.288
Ddy (Reference: none)	-10.665 (-39.624 - 18.293)	-0.038	-0.727	0.468	1.157
Hypothyroidism (Reference: none)	21.273 (-8.599 - 51.144)	0.088	1.405	0.162	1.634
Cardiac Disease (Reference: none)	-0.801 (-19.049 - 17.448)	-0.005	-0.087	0.931	1.338
Oncological Disease (Reference: none)	-11.843 (-38.221 - 14.536)	-0.049	-0.886	0.377	1.274
Kc Transplant (Reference: none)	2.243 (-33.8 - 38.285)	0.007	0.123	0.902	1.201
Microcephaly (Reference: none)	3.676 (-30.905 - 38.257)	0.011	0.210	0.834	1.106
Age	1.865 (0.468 - 3.262)	0.160	2.633	**0.009**	1.533
Number of fill levels	1.189 (0.842 - 1.536)	0.444	6.765	**<0.001**	1.786
Number of Root Canals Treated with Endodontic Treatment	1.642 (0.756 - 2.528)	0.237	3.656	**<0.001**	1.740
Presence of Systemic Disease (Reference: none)	7.163 (-3.901 - 18.228)	0.095	1.277	0.203	2.308
Type of Anesthesia (Reference: General anesthesia)	-19.767 (-29.517 - -10.018)	-0.241	-4.000	**<0.001**	1.512

F=10.943, p<0.001, Corrected R2=0.503, β0: Non standardized beta coefficient; β1: Standardized beta coefficient

cant.[13] The reason for preferring sedation over general anesthesia was stated as changes in pharmacokinetic effects due to the age-related increase in weight.[13] According to etiological studies, the severity of caries increases with age.[14] A study comparing the duration of treatment under general anesthesia between healthy children and children with systemic diseases reported that age was not significantly different between the groups.[14] Our study supports this finding. Therefore, in our study, there was no significant difference in age or choice of anesthesia type, as we decided to consider the patient's systemic condition first and then the requirements of the procedures to be performed while choosing the anesthesia method. In addition, these differences in the literature may be due to the variability in the ages of the patients in the samples included in the studies.

The number and type of dental procedures directly affect procedure time.[13,14] It has been determined that healthy children receive more restorative and endodontic treatment, while children with special needs receive more surgical procedures.[14] Our study determined that the probability of sedation increased in patients with multiple systemic diseases compared to those with only one systemic disease. This may be because having more than one systemic disease increases the risks of general anesthesia. In addition, our study showed that the probability of sedation decreased as the number of filling surfaces and root canals treated with endodontia increased. For this reason, the duration of the procedure must not be prolonged when planning the procedure in children, who should prefer sedation in terms of their systemic condition. Considering that restorative and endodontic treatments extend the duration of treatment, which reduces the possibility of sedation, it is understood why extraction treatments are preferred for these patients. Casal et al.[15], who compared dental treatments performed under general anesthesia in cerebral palsy patients and healthy patients and their duration, reported no statistically significant difference between the two groups regarding the duration of general anesthesia. Considering these studies, the number of transactions and the type of transaction directly affect the duration of the transaction. In our study, regardless of the patient's systemic condition, the duration of the procedure increased as the number of filled surfaces and the number of root canals treated with endodontic treatment increased. General anesthesia may be preferred over sedation since the operation time is prolonged when treating patients for a long time.[14] In our study, the procedure time under sedation was 19.767 times less than that under general anesthesia. Therefore, the treatment to be performed directly affects the duration. Mental retardation, age, filling number, and root canal treatment number significantly increased the procedure time.

No complications are reportedly encountered under general anesthesia while treating patients who regularly use anticonvulsant drugs for epilepsy.[16] However, general anesthesia should be avoided as much as possible, as the brain may suffer from temporary anoxia, which may initiate epileptic seizures during general anesthesia.[17] On the other hand, seizure development can be controlled by nitrous oxide inhalation sedation or intravenous benzodiazepine sedation during dental treatment. However, it was emphasized that seizures can sometimes develop during dental treatments despite intravenous sedation, and in such cases, the treatment should be postponed.[16-18] In our clinic, when choosing anesthesia for non cooperative epilepsy patients, attention is given to the use of multiple drugs, and necessary precautions are taken against the risk of seizures. After these precautions are taken, the type of anesthesia used should be selected according to the number of intraoral procedures performed on epilepsy patients, the need to work with water, and the predicted duration of anesthesia. Since anesthesiologists can control systemic disease -related findings, the percentage of epilepsy patients in our study who received general anesthesia was 63.2%,

while the percentage of sedation was 36.8%. However, the distribution of anesthesia types was similar between children with and without epilepsy. Therefore, the effect of epilepsy on the type of anesthesia was not statistically significant in this study.

When the postoperative conditions of patients treated under general anesthesia were evaluated, Casal et al. reported that sleepiness in the cerebral palsy group was longer than in the healthy group.[15] Particular attention should be given to respiratory functions because reactive airway disease and chronic pneumonia may be expected during preoperative physical examinations. In addition, many patients have spinal deformities or severe scoliosis. Although the airway usually appears normal, head and neck contractures require attention during tracheal intubation.[19] Another factor that may cause difficulty in intubation is excess secretion.[20] Although most physicians routinely prefer to use tracheal intubation, it has been stated that mask ventilation and laryngeal mask airways are more suitable options.[21] In our study, tracheal intubation was applied to patients treated under general anesthesia, and the general anesthesia rate of patients with cerebral palsy was significantly lower. Sedation is preferred for the dental treatment of these patients.

Rada et al. reported that postop urticaria, bleeding, and soft tissue trauma due to local anesthesia developed in patients with autism who completed their dental treatments under general anesthesia. However, they claimed that these side effects did not result directly from general anesthesia and that they healed on their own in the days that followed. Additionally, some patients experience adverse effects, such as a decrease in the tendency to commit violence toward personal behaviors after general anesthesia. Since patients with severe autism symptoms cannot express themselves or describe their pain, calming them after treatment was associated with relief of their pain.[22]In our study, there were no data for this parameter, so there was no evaluation of behavior. On the other hand, the weight of the autistic patients and the procedures performed were evaluated by anesthesiologists, and the type of anesthesia was chosen. This distribution was statistically similar in the autistic patient group.

Airway management in patients with Down syndrome may be complex due to anatomical anomalies. Sedation is not recommended in the literature for people with difficult ventilation.[23] It has been reported that anesthesia complications such as bradycardia, airway obstruction, and post intubation grouping tend to increase during anesthesia induction due to the complex craniofacial and cardiovascular abnormalities observed in patients with Down syndrome.[24] In our study, Down syndrome alone was not found to be effective in the selection of anesthesia type. However, in the multi-disease group in our study, patients with Down syndrome were evaluated in addition to the anomalies mentioned in the literature. It was determined that these patients had a significantly greater rate of sedation. In patients with chromosomal gene disorders other than Down syndrome, sedation was determined to be the preferred anesthesia type.

A limitation of this study is that the complications that occurred were not discussed because the intraoperative and postoperative complication records could not be accessed from the patient files. Another limitation is the single-center design of the study. In future studies, intraoperative and postoperative complications may be recommended.

CONCLUSION

This study shows that factors such as systemic disease, the number of teeth, fillings and root canal treatment play an essential role in anesthesia selection and the procedure's duration. In light of this information, to improve the quality of oral and dental health services in children and provide a standardized approach, it is of great importance to create evidence-based clinical practice guidelines based on patient characteristics in the selection of anesthesia. These guidelines can improve pediatric patient safety and treatment outcomes by providing clear and consistent protocols for general anesthesia and sedation applications. There is a need for multicenter studies to evaluate risk level factors in selecting anesthesia methods and help establish guidelines for deciding which procedures can be performed under general anesthesia and sedation.

Ethics Committee Approval: Ethics committee approval was received for this study from the Clinical Research Ethics Committee of Erciyes University (Date: 9/11/2022, Number: 2022/769).

Informed Consent: Not applicable to this retrospective study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept-ZAG; Design- ZAG; Supervision -ZAG, ABS, DGC, SOY; Resources- ZAG, ABS; Materials- ZAG, ABS, DGC, SOY; Data Collection and/or Processing - ZAG, ABS; Analysis and/or interpretation - ZAG, ABS, DGC; Literature review - ZAG, ABS; Writing Manuscript - ZAG, ABS; Critical review - DGC, SOY.

Declaration of Interests: There is no conflict of interest.

Funding: Not applicaple.

Etik Komite Onayı: Bu çalışma için Erciyes Üniversitesi Klinik Araştırmalar Etik Kurulundan (Tarih:9/11/2022, Sayı: 2022/769) onay alınmıştır.

Bilgilendirilmiş onam: Dosya taraması yapılmıştır, bilgilendirilmiş onam alınmamıştır.

Hakem Değerlendirmesi: Dış bağımsız

Yazar Katkıları: Fikir-ZAG; Tasarım- ZAG; Denetleme - ZAG, ABS, DGC, SOY; Kaynaklar-ZAG, ABS; Malzemeler-ZAG, ABS, DGC, SOY; Veri Toplanması ve/veya işlenmesi-ZAG, ABS; Analiz ve/veya yorum-ZAG, ABS, DGC; Literatür taraması-ZAG, ABS; Yazıyı yazan-ZAG, ABS;Eleştirel inceleme-DGC,SOY.

Çıkar Çatışması: Çıkar çatışması yoktur.

Finansal Destek: Bu çalışma için hibe veya destek yoktur.

REFERENCES:

1. Petersen PE. Challenges to improvement of oral health in the 21st century--the approach of the WHO Global Oral Health Programme. *Int Dent J*. 2004;54(6 Suppl 1):329-343. doi:10.1111/j.1875-595x.2004.tb00 009.x.
2. Chi DL. Oral Health for US Children with Special

WHO Global Oral Health Programme. *Int Dent J*. 2004;54(6 Suppl 1):329-343. doi:10.1111/j.1875-595x.2004.tb00 009.x.
2. Chi DL. Oral Health for US Children with Special Health Care Needs. *Pediatr Clin North Am*. 2018;65 (5):981-993. doi:10.1016/j.pcl.2018.05.007.
3. Monse B, Duijster D, Sheiham A, Grijalva-Eternod CS, van Palenstein Helderman W, Hobdell MH. The effects of extraction of pulpally involved primary teeth on weight, height and BMI in underweight Filipino children. A cluster randomized clinical trial. *BMC Public Health*. 2012;12:725. doi:10.1 186/1471-2458-12-725.
4. American Academy of Pediatric Dentistry. Management of dental patients with special health care needs. The Reference Manual of Pediatric Dentistry. Chicago, Ill.: American Academy of Pediatric Dentistry. 2023;337-344.
5. Norderyd J, Faulks D, Molina G, Granlund M, Klingberg G. Which factors most influence referral for restorative dental treatment under sedation and general anaesthesia in children with complex disabilities: caries severity, child functioning, or dental service organisation? *Int J Paediatr Dent*. 2018;28 (1):71-82. doi:10.1111/ipd. 12305.
6. American Dental Association. Guidelines for the use of sedation and general anesthesia by dentists. Adopted by the ADA House of Delegates. https://www.ada.org/-/media/project/ada-organization/ada/ada org/files/resources/research/ada_sedation_use_guidelines.pdf?rev=3139 32b4f5eb49e491926d4feac00a14&hash=C7C55D7 182C639197569D4ED8EDCDDF6.October 2016;1-15.
7. Sacchetti A, Turco T, Carraccio C, Hasher W, Cho D, Gerardi M. Procedural sedation for children with special health care needs. *Pediatr Emerg Care*. 2003;19(4):231-239. doi:10.1097/01.pec.0000086 232.54586.ce.
8. Guidelines for Office-Based Anesthesia. American Society of Anesthesiologists (ASA). https://www.asahq.org/standards-and-guidelines/guidelines-for-office-based-anesthesia Accessed April 5,2023.
9. Baakdah RA, Turkistani JM, Al-Qarni AM, et al. Pediatric dental treatments with pharmacological and non-pharmacological interventions: a cross-sectional study. *BMC Oral Health*. 2021;21(1):186. doi:10.1186/s12903-021-01555-7.
10. Blayney MR, Malins AF, Cooper GM. Cardiac arrhythmias in children during outpatient general anaesthesia for dentistry: a prospective randomised trial. *Lancet*. 1999;354(9193):1864-1866. doi:10.10 16/s0140-6736(99)02485-x.
11. Sinclair RCF, Faleiro RJ. Delayed recovery of consciousness after anaesthesia. *CEACCP.* 2006;6:114-118. doi:10.1093/bjaceaccp/mkl020.
12. Campbell RL, Shetty NS, Shetty KS, Pope HL, Campbell JR. Pediatric Dental Surgery Under General Anesthesia: Uncooperative Children. *Anesth Prog*. 2018;65(4):225-230. doi:10.2344/anpr-65-03-04.
13. Mangione F, Bdeoui F, Monnier-Da Costa A, Dursun E. Autistic patients: a retrospective study on their dental needs and the behavioural approach. *Clin Oral Investig*. 2020;24(5):1677-1685. doi:10.1007/s00784-019-03023-7.
14. Loyola-Rodriguez JP, Zavala-Alonso V, Gonzalez-Alvarez CL, Juarez-Lopez LA, Patiño-Marin N, Gonzalez CD. Dental treatment under general anesthesia in healthy and medically compromised developmentally disabled children: a comparative study. *J Clin Pediatr Dent*. 2009;34(2):177-182. doi:10.177 96/jcpd.34.2.u66 5328k4g467pg2.
15. Escanilla-Casal A, Aznar-Gómez M, Viaño JM, López-Giménez A, Rivera-Baró A. Dental treatment under general anesthesia in a group of patients with cerebral palsy and a group of healthy pediatric patients. *Med Oral Patol Oral Cir Bucal*. 2014;19 (5):e490-e494. doi:10.4317/medoral.19568.
16. Fiske J, Boyle C. Epilepsy and oral care. *Dent Update*. 2002;29(4):180-187. doi:10.12968/denu.2002.29. 4.18 0.
17. Malamed SF. Handbook of Local Anesthesia. 4th ed. St. Louis, MO: CV Mosby Co; 1997.
18. Gallagher S, Weiss S, Oram Cardy J, Humphries T, Harman KE, Menascu S. Efficacy of very high dose steroid treatment in a case of Landau-Kleffner syndrome. *Dev Med Child Neurol*. 2006;48(9):766-769. doi:10.1017/S0012162206001630.
19. Lerman J. Perioperative management of the paediatric patient with coexisting neuromuscular disease. *Br J Anaesth*. 2011;107 Suppl 1:i79-i89. doi:10.1093/bja/aer335.
20. Wass CT, Warner ME, Worrell GA, et al. Effect of general anesthesia in patients with cerebral palsy at the turn of the new millennium: a population-based study evaluating perioperative outcome and brief overview of anesthetic implications of this coexisting disease. *J Child Neurol*. 2012;27(7):859-866. doi:10.1177/0883073811 428378.
21. Fromer I, Belani K. Anesthesia for children with cerebral palsy. In: Goudra B, et al., eds. *Anesthesiology.* Cham, Switzerland: Springer; 2018:429-434. doi:10.1007/978-3-319-74766-8_45.
22. Rada RE. Treatment needs and adverse events related to dental treatment under general anesthesia for individuals with autism. *Intellect Dev Disabil*. 2013;51(4):246-252. doi:10.1352/1934-9556-51. 4.246.
23. Cremers MJ, Bol E, de Roos F, van Gijn J. Risk of sports activities in children with Down's syndrome and atlantoaxial instability. *Lancet.* 1993;342 (8870):511-514. doi:10.1016/0140-6736(93)916 44-2.
24. Kraemer FW, Stricker PA, Gurnaney HG, et al. Bradycardia during induction of anesthesia with sevoflurane in children with Down syndrome. *Anesth Analg*. 2010;111(5):1259-1263. doi:10.1213/ANE.0b 013e318 1f2eacf.