

Retrospective Evaluation of Cases Undergoing Dental Treatments Under General Anesthesia

Genel Anestezi Altında Dental Tedavileri Yapılan Olguların Retrospektif Değerlendirilmesi

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ABSTRACT

INTRODUCTION: Aim of this study is to discuss the reasons for treating pediatric patients under general anesthesia, American Society of Anesthesiologists (ASA) scores, systemic disease, consultations, endocarditis prophylaxis, need for repeated general anesthesia and dental treatment in the light of the literature.

METHODS: In our study, files in the archives of medicine and dentistry faculties and general anesthesia-dental treatment consents of 188 patients aged 1-16 were examined. The information obtained as a result of the examination was evaluated under the headings of "demographic data, ASA scores, general anesthesia experience, prophylaxis, systemic diseases, consultations, reasons for general anesthesia and dental treatments".

RESULTS: Of the 188 patients operated with 99(52.66%) ASAII, 70(37.23%) ASA I and 19(10.11%) ASAIII risk. The most common systemic diseases were epilepsy (48%) followed by CVS diseases (36%). The departments referred for consultation are pediatrics (39.46%), pediatric neurology (31.97%) and pediatric cardiology (12.24%). Causes of general anesthesia; 49(26.06%) patients were uncooperative and 139(73.94%) patients were in need of special health care needs. 2143 dental treatments were performed which were 1220(56.93%) restorative treatment, 193(9.01%) endodontic treatment, 645(30.10%) tooth extraction, 47(2.19%) preventive treatment and 38(1.77%) of Phase-I periodontal therapy.

DISCUSSION AND CONCLUSION: General anesthesia is effective and reliable treatment method in the dental treatment of children with uncooperation and special health care needs.

Keywords: Dental Treatment, General Anesthesia, Pediatric Dentistry

ÖZ

GİRİŞ ve AMAÇ: Bu çalışmanın amacı, çocuk hastaların genel anesteziye alınma sebeplerinin, American Society of Anesthesiologists (ASA) skorlarının, sistemik rahatsızlıkların, istenilen konsültasyonların, profilaksi gerekliliğinin, tekrarlanan genel anestezi ihtiyacının ve uygulanan dental işlemlerin güncel literatür eşliğinde tartışılmasıdır.

YÖNTEM ve GEREÇLER: Çalışmamız kapsamında, yaşları 1-16 arası değişen 188 hastanın, tıp ve diş hekimliği fakültelerinin arşivlerinde bulunan dosyaları ile genel anestezi ve dental tedavi onamları incelendi. İnceleme kapsamında elde edilen bilgiler, "demografik veriler, ASA skorları, genel anestezi geçmişi, profilaksi gerekliliği, sistemik durumlar, istenilen konsültasyonlar, genel anesteziye alınma sebepleri ve uygulanan dental tedaviler" başlıkları altında değerlendirildi.

BULGULAR: Tedavileri tamamlanan 188 hastanın 99'u(%52,66) ASAII, 70'i(%37,23) ASA I ve 19'u(%10,11) ASAIII riskle opere edilmiştir. En az bir kez dental genel anestezi geçmişi olan hasta sayısı 12 (%6,39)'dir. En sık karşılaşılan sistemik hastalıkların epilepsi (%48) ve KVS hastalıkları (%36) olduğu görülmüştür. En sık konsültasyon ihtiyacı olan bölümler ise pediatri (%39,46), çocuk nöroloji (%31,97) ve çocuk kardiyojodir (%12,24). Genel anestezi nedenleri incelendiğinde 49 (%26,06) hastanın kooperasyon yetersizliği ve 139 (%73,94) hastanın özel bakım ihtiyacı olduğu öğrenilmiştir. Uygulanan 2143 dental tedavinin 1220'si(%56,93) restoratif tedavi, 193'ü(%9,01) endodontik tedavi, 645'i(%30,10) diş çekimi, 47'si(%2,19) koruyucu tedavi ve 38'i(%1,77) Faz-I periodontal tedaviden oluşmaktadır.

TARTIŞMA ve SONUÇ: Kooperasyon yetersizliği ve özel bakım ihtiyacı olan çocukların dental tedavisinde genel anestezi etkili ve güvenilir bir tedavi yöntemidir.

Anahtar Kelimeler: Çocuk Diş Hekimliği, Dental Tedavi, Genel Anestezi

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INTRODUCTION

Pediatric dentistry is responsible for protecting the oral health of infants, children, and adolescents as well as for treating their dental problems. Most pediatric patients can be treated under local anesthesia by providing an adequate level of cooperation with the use of nonpharmacological behavior guidance techniques such as tell–show–do, voice control, distraction, and positive encouragement.^{1,2} General anesthesia, which is one of the pharmacological behavioral guidance techniques, can be a treatment option for young children who require extensive and long-term dental treatment to be applied in multiple sessions; for patients who do not have psychological or emotional maturity; who cannot cooperate due to physical, mental, or medical disabilities; and/or those who require long-term and complex surgical procedures.³ All the dental treatments of these patients (such as restorative, endodontic, preventive, and periodontal treatments and tooth extraction) are performed effectively under general anesthesia, under optimum conditions, and oral rehabilitation is achieved in a single session.⁴

General anesthesia has the advantage of not requiring cooperation, providing an opportunity to perform all procedures comprehensively in a single session, and avoiding bad memories about the dental procedures.⁵ However, it requires a special team of experts and specific equipment, and it can lead to serious complications. Therefore, it should be the last resort, care should be taken when it is indicated, and a profit-and-loss assessment should be performed before the final decision is made in favor of general anesthesia.³

According to the literature review, studies are focusing on dental treatments applied to pediatric patients treated under general anesthesia or the reasons for the administration of general anesthesia.^{6,7,8} However, most of these studies do not evaluate preoperative medical records, general anesthesia history, and reasons for the administration of general anesthesia and dental procedures together. Therefore, we conducted a retrospective study to discuss the reasons for the administration of general anesthesia in pediatric patients who underwent dental treatment under general anesthesia between 2016 and 2020, along with their American Society of Anesthesiologists (ASA) scores, systemic diseases, consultations requested, need for prophylaxis and repeated general anesthesia, and the applied dental procedures in light of the current literature.

MATERIALS AND METHODS

Approval for the study was obtained from Necmettin Erbakan University Faculty of Dentistry Ethics Committee for Non-Pharmaceuticals and Non-Medical Devices Studies (2019/07). A total of 188 patients including 71 girls and 117 boys aged 1–16 years, who underwent dental treatments under general anesthesia between 2016 and 2020 were included in the study. The

patients’ medical records and their consents for general anesthesia and dental treatment in the archives of the medical and dentistry faculties were reviewed to obtain and collate the information for the present study. The information obtained from the patients’ medical records was as follows: demographic data (age and gender), ASA scores, general anesthesia history, endocarditis prophylaxis, accompanying systemic diseases, and consultation requests. The reasons for general anesthesia were grouped into cooperation problems and mental and/or physical disabilities (mental retardation, autism, Down’s syndrome, cerebral palsy, developmental retardation, etc.).

In addition, the records of dental treatments performed under general anesthesia were compiled. The treatments performed were grouped as follows: 1) protective applications (fissure sealants etc.), 2) Phase-I periodontal treatment, 3) restorative treatment, 4) endodontic treatment, and 5) tooth extraction. The data obtained were analyzed using descriptive statistical methods.

RESULTS

The mean age of 188 patients including 71 girls (37.77%) and 117 boys (62.23%), whose dental treatments were completed under general anesthesia, was 7.04 ± 3.95 (min, 1; max, 16) years. The mean ages of girls and boys were 7.21 ± 4.24 and 6.94 ± 3.78 , respectively. The patients’ operation histories revealed that 176 (93.62%) had undergone dental treatment for the first time under general anesthesia, 9 (4.79%) had a history of one general anesthesia, and 3 (1.60%) had a history of more than one general anesthesia. Further, of these, 70 (37.23%), 99 (52.66%), and 19 (10.11%) were operated with risks of ASA I, II, and III, respectively (Table 1).

Table 1. General characteristics of patients

	Mean (mean \pm SD), year	
Age	7.04 \pm 3.95	
Female	7.21 \pm 4.24	
Male	6.94 \pm 3.78	
	Number (n)	Percentage (%)
Gender		
Female	71	37.77%
Male	117	62.23%
Total	188	
ASA* classification		
ASA I	70	37.23%
ASA II	99	52.66%
ASA III	19	10.11%
History of general anesthesia		
0	176	93.62%
1	9	4.79%
>1	3	1.60%

*American Society of Anesthesiologists

The medical conditions of the patients with systemic diseases were as follows: epilepsy, 24 (48%) patients; cardiovascular system (CVS) diseases, 18 (36%); and immune system disorders, 2 (4%). Of the consultations requested a total of 147, the most common was from the pediatrics (39.46%) followed by pediatric neurology (31.97%), pediatric cardiology (12.24%), neurosurgery (4.76%), and child psychiatry (2.72%) as the main clinics applied for consultation. Additionally, the need for prophylaxis was present in 10 (5.32%) of the 188 patients; of these, nine (4.79%) had at least one disability and one (0.53%) was treated under general anesthesia due to lack of cooperation (Table 2).

Table 2. Medical conditions of patients

	Number (n)	Percentage (%)
Prophylaxis requirement		
Prophylaxis: Non-cooperative	1	0.53%
Prophylaxis: Disabled	9	4.79%
Total	10	5.32%
Systemic disease		
Neurological Problems (Epilepsy etc.)	24	48.00%
CVS diseases*	18	36.00%
Immune system disorders	2	4.00%
Hematological diseases	1	2.00%
Lung diseases	1	2.00%
Liver diseases	1	2.00%
Crohn's disease	1	2.00%
Kidney diseases	1	2.00%
Osteoporosis	1	2.00%
Total	45	
Consultation		
Pediatrics	58	39.46%
Pediatric Neurology	47	31.97%
Pediatric Cardiology	18	12.24%
Neurosurgery	7	4.76%
Child Psychiatry	4	2.72%
Pediatric Pulmonology	2	1.36%
Pediatric Gastroenterology	2	1.36%
Child Allergy Immunology	2	1.36%
ENT**	2	1.36%
Ophthalmology	2	1.36%
Dermatology	1	0.68%
Pediatric Hematology	1	0.68%
Pediatric Nephrology	1	0.68%
Total	147	

* Cardiovascular system diseases

** Ear Nose Throat

The reasons for the administration of general anesthesia were as follows: inadequate cooperation 49 (26.06%) patients; autism 30 (15.96%); mental retardation 26

(13.83%); cerebral palsy 24 (12.77%); epilepsy 19 (10.11%); Down's syndrome 11 (5.85%); brain diseases 10 (5.32%); hearing and/or vision impairment 6 (3.19%); developmental retardation 4 (2.13%); physical insufficiency 3 (1.60%); and other reasons in 6 (3.19%) (Table 3).

Table 3. Reason for general anesthesia

	Number (n)	Percentage (%)
Inadequate cooperation	49	26.06%
Disabled patients	139	73.94%
Autism	30	15.96%
Mental retardation	26	13.83%
Cerebral palsy	24	12.77%
Epilepsy	19	10.11%
Down's syndrome	11	5.85%
Brain disorders	10	5.32%
Hearing- and/or visually-impaired	6	3.19%
Developmental retardation	4	2.13%
Physical disability	3	1.60%
Others*	6	3.19%
Total	188	

*Kidney failure, lung disease, liver enzyme deficiency, speech impairment, and motor function failure

Among the 2143 dental treatments applied, 1220 (56.93%), 193 (9.01%), 645 (30.10%), 47 (2.19%), and 38 (1.77%) were restorative treatments, endodontic treatment, tooth extractions, preventive treatments, and phase-I periodontal treatments, respectively (Table 4).

Table 4. Applied dental treatments

	Number (n)	Percentage (%)
Restorative treatment	1220	56.93%
Endodontic treatment	193	9.01%
Tooth extraction	645	30.10%
Preventive treatment	47	2.19%
Phase-I periodontal treatment	38	1.77%
Total	2143	

DISCUSSION

General anesthesia is used in pediatric dentistry practices wherein nonpharmacological behavior guidance techniques are insufficient due to various reasons. Currently, it is mostly preferred to complete dental treatments of young patients who require comprehensive dental procedures; who have cooperation problems; and those with physical, mental, or medical disabilities in a single session under optimum conditions.^{9,10}

The parents of patients who require special health care tend to give due importance to oral care at an advanced age because they are preoccupied with dealing with serious, life-threatening systemic diseases in the

first years of life, thus postponing the possible need for general anesthesia to the following years. According to Haubek *et al.*,¹¹ the mean age of healthy children treated under general anesthesia was lower than that of children with systemic diseases. Similarly, Cantekin *et al.*¹² reported that the mean age of healthy children treated with general anesthesia was under 5 years of age, whereas it was over 6 years in children with disabilities or chronic diseases. In the present study, the mean age was 7.04 ± 3.95 years. The mean ages of the operated patients in many studies were found to be lower than that found in the present study.^{11,12} This can be explained by the fact that disabled patients, who are given priority at our hospital, constituted the majority of our study group.

Jang *et al.*¹³ reported in their study that 60% of patients treated under general anesthesia were male and 40% were female. Similarly, Shin *et al.*¹⁴ evaluated the data of 263 patients aged between 1 and 16 years during a 5-year retrospectively and found that 176 (66.9%) operated patients were male. Consistent with the literature, the number of male patients (62.23%) was higher than that of female patients (37.77%) in the present study.

In most of the studies examining the dental treatments of pediatric patients under general anesthesia in literature, no information was given about the ASA scores of the patients. In a study conducted by Akpınar,¹⁵ 2854 (84.43%), 517 (15.29%), and nine (0.26%) patients were operated on with risks of ASA I, II, and III, respectively. In contrast, in another study that examined 467 patients with a mean age of 16.78 ± 12 years, it was reported that 234 patients were operated on with a risk of ASA II (50.1%).¹⁶ In the present study, 99 (52.66%), 70 (37.23%), and 19 (10.11%) patients were operated on with risks of ASA II, I, and III, respectively. This can be explained by the priority given to treat children with severe systemic diseases or those with special health care needs at our hospital as well as the high ASA scores associated with accompanying systemic diseases.

Kakaounaki *et al.*¹⁷ examined the need for recurrent general anesthesia and reported that 10.7% of 484 children operated on have subsequently retreated under general anesthesia at least. Jankauskienė *et al.*¹⁸ stated in their study in Lithuania that 15.3% patient population had previously been treated under general anesthesia. Supporting this, Oh *et al.*¹⁹ reported that patients who did not attend follow-up sessions after general anesthesia were four times more likely to receive treatment under general anesthesia for the second time compared to those who came for follow-up visits periodically. In the present study, 4.79% and 1.60% of patients had been operated on once and twice before, respectively. To prevent the need for repeated general anesthesia, a personalized oral care program and effective follow-up protocol should be established.

Özkan *et al.*¹⁶ reported that 36 (7.7%) of 467 patients needed preoperative prophylaxis; however, they did not

explain the systemic diseases and the reasons for the administration of general anesthesia in these patients. In the present study, 10 (5.32%) of 188 patients required prophylaxis, and nine of these had a disability and one had a problem with cooperation.

Of the systemic diseases, those that did not constitute a cause for general anesthesia administration but accompanied the main causes for general anesthesia administration were neurological problems (epilepsy, etc.) (48.00%) and CVS diseases (36.00%), which were the most common ones. Related to these, the departments with the highest number of consultation requests were pediatrics (39.46%), pediatric neurology (31.97%), and pediatric cardiology (12.24%). These results are consistent with those reported in many studies.^{15,20}

Pecci-Lloret *et al.*²¹ studied 111 patients with special health care needs and found that the patients were operated on mostly due to encephalitis (15%) followed by autism, mental disability, epilepsy, and Down's syndrome. Shin *et al.*¹⁴ studied children with disability and healthy children and found that the majority (43.8%) of the operated patients comprised healthy children with anxiety or phobia. In a retrospective study conducted by Çiftci and Yazicioğlu,²² it was reported that 79.5% of patients required special health care, whereas 20.5% were healthy children with cooperation problems. Of the patients who needed special health care, 30.1%, 14.7%, 14%, 13.6%, and 7.3% had epilepsy, various syndromes, autism, Down's syndrome, and cerebral palsy, respectively. Similarly, of the 188 patients included in the present study, 26.06%, 15.96%, 13.83%, 12.77%, 10.11%, and 5.85% were operated due to inadequate cooperation, autism, mental retardation, cerebral palsy, epilepsy, and Down's syndrome, respectively. It has been suggested that ethnic differences, genetic variations, and medical conditions affect the composition of the study population.²³ As in many studies, the records we used in the present study did not contain sufficient information about ethnic origin, immigration status, and cultural differences; therefore, there may be differences between studies due to these reasons.

Many studies have stated that the systemic diseases of patients with medical or mental problems may change the oral health service to be provided.^{24,25} Supporting this, many studies have reported that tooth extraction is the most common treatment used in patients who need special health care.²⁶ Escanilla-Casal *et al.*²⁷ included individuals with a disability and concluded that endodontic treatments are the least preferred among all treatments. In contrast, Mallineni and Yiu²⁸ examined dental procedures performed in 275 patients with special health care needs who were treated under general anesthesia and reported that 47% of 3217 procedures comprised restorative procedures. Rajavaara *et al.*²⁹ examined the records of treatments performed under general anesthesia in healthy patients with medical problems and reported that the percentage of restorative

treatments was higher in these patients. In another study in which 40 patients were evaluated, restorative treatment accounted for 37%, root canal treatment in primary teeth for 34%, and tooth extraction for only 7%.³⁰ Of 2143 treatments performed in 188 patients in the present study, 1220 (56.93%) were restorative treatments, 645 (30.10%) were tooth extractions, 193 (9.01%) were endodontic treatments, 47 (2.19%) were preventive treatments and 38 (1.77%) were phase-I periodontal treatments.

CONCLUSIONS

- Although general anesthesia is an expensive and difficult treatment that can cause complications, it is frequently preferred because it facilitates successful and comprehensive dental treatment (restorative, endodontic, preventive, and periodontal treatments, tooth extraction, etc.) in pediatric patients with cooperation problems and those with physical, mental, or medical disabilities in a single session under optimum conditions.
- Some patients who require general anesthesia are children with cooperation problems. Therefore, the development of non-pharmacological behavior guidance techniques should be emphasized.

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- Before deciding to administer general anesthesia, the dental treatment needs and systemic diseases of the patients should be evaluated in detail, the relevant and necessary departments should be consulted, and the profit-and-loss calculation should be performed.
- Most patients who undergo dental treatment under general anesthesia are those with special health care needs. Individuals with a disability may delay their oral care in the first years of life due to the serious diseases they have. Therefore, to reduce the rate of first-experience general anesthesia and the need for repeated general anesthesia, oral care of individuals with a disability should be diligently provided from the first years of life, and if necessary, a personalized oral care program and mandatory follow-up procedure should be developed for all patients.

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CONFLICT OF INTEREST

The authors of this study declare no conflict of interest.

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