

Analysis of Pediatric Dentistry Patients Treated Under General Anesthesia

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ABSTRACT

Background: This study was to determine the characteristics of children treated under general anaesthesia according to age, gender and medical condition, to investigate different indications for the dental treatment in children, and to assess the mean number of different dental procedures performed under general anaesthesia, in a single dental care unit in one year, according to age groups, indications and medical conditions. **Methods:** A retrospective study was designed. Data were collected from patients rehabilitation under general anaesthesia over a one year period (February-2018 to January-2019). The information collected from the records included age, gender, general health status, indications for general anaesthesia, type of procedure, attendance for review appointment and treatment provided including the number of primary and permanent teeth extracted and restored. **Results:** A total of 107 patients, 64 male and 43 female received dental treatment under general anaesthesia at private dental clinic in Istanbul, Turkey. The main indications for general anaesthesia were behaviour management problem (44.6%). It was determined that the number of dental fillings in primary teeth was higher (60.16%) in the 2-5 year age group. **Conclusion:** It has been observed that application of general anesthesia is an effective and efficient way in providing dental treatment to disabled individuals with special healthcare needs, young children with poor cooperation and children requiring comprehensive dental treatment as the dental treatment can be completed in a single session.

Keywords: Behavior Management, Endodontic Treatment, General Anesthesia, Pediatric Dentistry.

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INTRODUCTION

Children often feel anxious and exhibit limited cooperation during dental treatments, but it is important to establish a good relationship between the child, parents and dental professional.^[1] Dental procedures are mostly performed easily in children with whom the communication can be established, whereas there are cases where the use of general anesthesia (GA) is the only option to provide a safe and effective treatment in pediatric patients.^[2] Patients with mental and physical disabilities are among these cases. GA is frequently required in patients with mental or some physical disabilities, who are a part of the society, due to difficulties in cooperation during dental procedures. Furthermore, GA is commonly used in patients with psychological problems, more extensive procedures requiring GA rather than local anesthesia, orofacial trauma or jaw fractures,^[3-5] and allergic reactions to local anesthetics.^[5] The comprehensive dental treatment

in patients with uncontrolled epilepsy,^[5] mental retardation and non-cooperation is also performed under GA.^[6,7] In addition, it was shown that GA facilitates dental procedures for the dental professionals, thus improving the success rate as well as improving patient satisfaction and quality of life in different patient groups.^[7,8]

In the literature, the conditions under which GA is required have been listed as follows: children with extreme anxiety or fear who refuse to accept treatment under local anesthesia, children at early age with a few decayed teeth, children with mental or physical disabilities requiring special health care, and children requiring oral surgery.^[9-12] Dental procedures under GA may vary according to indications, such as the patient's disability, lack of co-operation, or the requirement for multiple treatments.

The purpose of this study was to determine the characteristics of children treated under GA according to age, gender and medical condition, to investigate different indications for the dental treatment in children, and to assess the mean number of different dental procedures performed under GA, in a single dental care unit in one year, according to age groups, indications and medical conditions.

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MATERIALS & METHODS

All clinical data were examined and collected retrospectively from the records of children aged between 2-12, who underwent dental treatment under GA in the pediatric dentistry. The study approved by the Istanbul Medipol University Medical Research Ethics Committee on 22.03.2019 with no.213.

The records of the patients treated under GA in a private dental center in Istanbul between 01 February 2018 and 31 January 2019 were assessed after obtaining the necessary permissions. A total of 107 patients (64 boys and 43 girls) who underwent dental treatment under GA were evaluated. Only those with correct and accurate records were included. The patients ranged in age from 2 to 12 years at the time of the treatment. The patients were grouped according to their age as (2-5), (6-9) and (10-12). The main indications for the decision of GA were determined as follows; physical or mental disability, requirement for multiple procedures due to severe tooth decay, lack of cooperation or behavior management problems, and the need for oral surgery. The data collected from the records were also used to evaluate the patients' age at the time of the treatment, gender, overall health status, the main indicator for GA, the number of extracted and restored primary and permanent teeth, and the type of dental restoration.

The data were analyzed using computerized Statistical Package for Social Sciences (SPSS) 21 for windows (SPSS Inc, Chicago, IL, USA). ANOVA test was used to compare the means of multiple variables. An Independent-Samples T-test was used to compare the means of two variable, while Chi-Square test was used when proportions were compared. The level of statistical significance was chosen at $p < 0.05$.

RESULTS

It was determined that a total of 107 patients, 64 (59.81%) boys and 43 (40.19%) girls, were included in the study with the mean age of 4.85 ± 2.29 . Most of the children (49.53%) were in the 2-5 age groups. Age and gender are demonstrated in [Table 1].

The evaluation of the indications for GA revealed that the most common indication was behavior management problem, which was observed in 52 (48.59%) patients, and it was mostly in the 2-5 year age group (35.51%). Out of 19 (17.75%) pediatric

children who were treated for severe tooth decay under GA, 13 (12.15%) were found to be in the 2-5 age group. The rate of children with disabilities was determined as 29.90%, and it was observed that they were mostly in the 10-12 age group (16.82%). It was determined that the rates of children indicated for oral surgical procedure were equal (1.87%) in the 6-9 and 10-12 age groups. The data are demonstrated in [Table 2].

The total number of restorations was determined as 505, and the mean number of dental restoration per child was 4.72 ± 2.28 . The evaluation of the correlation between the restorations and age groups revealed that the number of fillings in primary teeth in the 2-5 age group was higher (60.16%), revealing a statistically significant difference. Pulpotomy in primary teeth was higher in the 2-5 age group (56%), but there was no statistically significant difference. ($p > 0.05$) It was determined that the rate of endodontic treatment in primary teeth was higher in the 6-9 age group, whereas the rate of endodontic treatment in permanent teeth (85.71%) was higher in the 10-12 age group, revealing a statistically significant difference. ($p < 0.05$)

The total number of tooth extractions was found 374, with a number of 329 (87.96%) primary teeth extractions and 45 (12.03%) permanent teeth extractions. The mean number of total extracted teeth was 3.49 ± 2.35 with a mean number of 3.07 ± 2.17 primary teeth and 0.42 ± 0.19 permanent teeth extractions. It was observed that the rate of primary teeth extraction (46.50%) was higher in the 2-5 year age group, whereas the rate of permanent teeth extraction (80%) was higher in the 10-12 year age group, revealing a statistically significant difference. ($p < 0.05$) The data is demonstrated in [Table 3].

The evaluation of the correlation between the existing procedures and GA indications revealed that the rate of fillings in primary teeth was higher among the children with behavior management problems (54.47%), whereas the rate of primary teeth pulpotomy (56%) and endodontic treatment in primary teeth (56.25%) was higher among the children with severe tooth decay. There was found a statistically significant difference. ($p < 0.05$) The rate of endodontic treatment (78.57%) and the rate of permanent teeth extraction (68.88%) were higher in children with disabilities, and a statistically significant difference was found. ($p < 0.05$) The data is demonstrated in [Table 4].

Table 1: Age and gender

Age group	Males (%)	Females (%)	Total number (%)
2-5 years	34 (31.77%)	19 (17.75%)	53 (49.53%)
6-9 years	18 (16.82%)	14 (13.08%)	32 (29.90%)
10-12 years	12 (11.12%)	10 (9.34%)	22 (20.46%)
Total	64 (59.81%)	43 (40.19%)	107 (100%)

Table 2: Main indications and age groups

Main Indications	2-5 years n (%)	6-9 years n (%)	10-12 years n (%)	Total n (%)
Disabled (Physical or Mental)	2 (1.87%)	12 (11.21%)	18 (16.82%)	32 (29.90%)
Behavior Management Problem	38 (35.51%)	12 (11.21%)	2 (1.87%)	52 (48.59%)
Excessive Caries	13 (12.15%)	6 (5.60%)	0 (0%)	19 (17.75%)
Oral Surgery	0 (0%)	2 (1.87%)	2 (1.87%)	4 (3.74%)

Table 3: Treatments and age groups

Treatments	2-5 years n (%)	6-9 years n (%)	10-12 years n (%)	Total n (%)
Primary Tooth Restoration	*148 (60.16%)	72 (29.26%)	26 (10.56%)	246 (%)
Permanent Tooth Restoration	2 (1.45%)	47 (30.06%)	*89 (64.49%)	138 (%)
Pulpotomy	42 (56%)	27 (36%)	6 (8%)	75 (%)
Endodontic Treatment (Primary tooth)	12 (37.50%)	16 (50%)	4 (12.5%)	32 (%)
Endodontic Treatment (Permanent tooth)	0 (0%)	2 (14.28%)	*12 (85.71%)	14 (%)
Primary Tooth Extraction	153 (46.50%)	118 (35.87%)	58 (17.63%)	329 (87.96%)
Permanent Tooth Extraction	0 (0%)	9 (20%)	*36 (80%)	45 (12.03%)

*statistically difference

Table 4: Treatments and main indications

Treatments	Disabled n (%)	Behavior Management Problem n (%)	Excessive Caries n (%)	Oral Surgery n (%)
Primary Tooth Restoration	57 (23.17%)	*134 (54.47%)	52 (21.14%)	3 (1.21%)
Permanent Tooth Restoration	62 (44.93%)	66 (47.82%)	10 (7.25%)	0 (0%)
Pulpotomy	13 (17.33%)	20 (26.66%)	*42 (56%)	0 (0%)
Endodontic Treatment (Primary tooth)	5 (15.62%)	9 (28.12%)	*18 (56.25%)	0 (0%)
Endodontic Treatment (Permanent tooth)	*11 (78.57%)	2 (14.28%)	0 (0%)	2 (14.28%)
Primary Tooth Extraction	98 (29.79%)	167 (50.75%)	64 (19.45%)	2 (0.60%)
Permanent Tooth Extraction	*31 (68.88%)	8 (17.77%)	0 (0%)	6 (13.33%)

*statistically difference

DISCUSSION

Both adults and children experience anxiety during dental treatments as dental procedures are often perceived as painful by the society. It is important to establish a good communication between patient and dentist to reduce anxiety and ensure that the patient cooperates with the dentist. However, the level of cooperation in little children is limited. Therefore, dental treatment under GA is frequently performed due to the difficulty of cooperation in little children. This study reveals that most of the children undergoing dental treatment under GA are also in the early age group (2-5) as in previous studies.^[9-23]

The presence of higher number of boys in our study is consistent with the findings of previous studies.^[10,24] We are of the opinion that this is due to behavior management problems arising in boys as a result of an increase in aggression, hyperactivity, and dominance instinct due to testosterone, which increases gradually from preschool to adolescence.^[25,26]

GA can be used in pediatric patients with mental or physical disabilities as well as in healthy children with poor cooperation or those who cannot be

persuaded through cognitive therapy. In addition, oral rehabilitation may be provided in this difficult patient group.^[8]

The most frequent mutual causes for GA are the absence of cooperation or behavior management problems in children, mental and physical disabilities, and the requirement for comprehensive dental treatment due to severe tooth decay.^[1,27-31]

GA is frequently preferred for providing high standard dental treatment for patients with mental and physical disabilities.^[32] In this study, 32 (29,9%) patients required special health care, whereas 75 (70,1%) patients consisted of healthy children, which was consistent with the other studies.^[13,33]

Similarly to other studies,^[9,13,34] 52 (48.59%) children were treated under GA due to behavior management problems, which was the most common indication. A study conducted in Ireland revealed that the application general anesthesia was mostly requested in cases of multiple teeth extraction,^[12] and in the previous studies, the most frequent indication for dental treatment under GA was found to be behaviour management problems in pediatric children.^[9,13,34]

A study in Finland revealed that 21-36% of children had extreme dental fear and similarly,^[35] 5-19% of adults reported fear of visiting the dentist.^[36] In addition, a quarter of adults in the UK stated that they absolutely felt anxious about going to the dentist.^[37]

Due to the retrospective nature of the study, we excluded the cases from the indications for GA, in which the parents required GA for the healthy children with no severe tooth decay, no behavior management problems and no physical and mental disabilities. Recently, parents have been increasingly asking for treatment under GA, even in healthy children, as the perspective of families has changed due to dental fear, recurrent problems and unpleasant experiences during dental treatment.^[38]

However, prior to deciding on GA, the possible risks and necessity should be evaluated considering the complications that may occur during the application, and parents' informed consent should be obtained. It should be ensured that parents are aware of the severity of the procedure by explaining that the application will be performed by a team. The professionals in the team should gather with the parents prior to the procedure, and inform them about possible complications of GA. According to the instructions of the United Kingdom National Clinical Guidelines in Paediatric Dentistry, after deciding on GA, parents should be informed that anesthesia will be administered by a specialist anesthesiologist rather than by a dental professional. It should be stated that the procedure will be carried out in an operating room by a trained team of childcare professionals.^[19]

In the event that family insists on GA due to their concerns, alternative methods in the dental treatment, such as intravenous sedation, nitrous oxide inhalation sedation or the combinations should be considered especially in older children.^[39]

In our study, the mean number of restored teeth per child was found 4.72 ± 2.28 , and this figure included compomer and composite fillings, and glass-ionomer cement restorations. Some of the studies revealed a lower number,^[10] whereas some revealed a higher number.^[13,14] This may be attributed to the fact that parents are not encouraged for preventive treatment at an early stage to protect children's teeth, and then they require a treatment under GA when a more comprehensive treatment is required later on.

The fact that the higher rate of fillings, 56% of the total amputation and 37.5% of the total endodontic treatments in primary teeth were all found in the pediatric children aged between 2-5 may be due to the treatment requirements arising from early childhood caries.

The number of restorations in permanent teeth was higher in children with disabilities as they were older, which was consistent with previous studies.^[14,40]

There was a fewer number of tooth extractions (3.49 ± 2.35) with lower rates compared to the similar studies. In this study, both primary and permanent teeth were extracted, and the mean number of extractions in primary and permanent teeth was 3.07 and 0.42, respectively. According to these findings, the number of extractions in primary and permanent teeth was higher compared to other studies.^[18,40] The studies carried out in Australia and the UK revealed that the extraction of teeth under GA is more common in both children and adults.^[19,23]

The number of permanent tooth extractions was higher in children with special healthcare needs, and a statistical difference was found ($p < 0.05$). The results are consistent with those of the previous studies.^[2,14,40]

CONCLUSION

Although most children were treated successfully without requiring GA, there were a group of pediatric patients who required dental treatment under GA. It has been concluded that dental treatment under GA is an effective and efficient way of providing dental treatment. It provides an effective and comfortable treatment for children at early age, patients with special healthcare needs and children requiring comprehensive treatment as it enables to complete the dental treatment in a single session.

REFERENCES

1. Vinckier F, Gizani S, Declerck D. Comprehensive dental care for children with rampant caries under general anesthesia. *Int J Paediatr Dent* 2001; 11:25-32
2. Holt RD, Chidiac RH, Rule DC. Dental treatment for children under general anesthesia in day care facilities at a London dental hospital. *Br Dent J* 1991; 170: 262-6.
3. Vargas Román Mdel P, Rodríguez Bermudo S, Machuca Portillo G. Dental treatment under general anesthesia: a useful procedure in the third millennium? *Med Oral* 2003;8:129-35.
4. Alcaino E, Kilpatrick NM, Smith ED. Utilization of day stay general anaesthesia for the provision of dental treatment to children in New South Wales, Australia. *Int J Paediatr Dent* 2000;10:206-12.
5. Carson P, Freeman R. Dental caries, age and anxiety: factors influencing choice for children attending for emergency dental care. *Community Dent Oral Epidemiol* 2001;29:30-6.
6. Mehra P, Arya V. Temporomandibular joint arthrocentesis: outcomes under intravenous sedation versus general anesthesia. *J Oral Maxillofac Surg* 2015;73:834-42.
7. Saenz MC, Gomez ML, Goig MR, Cuesta US, Martin MI. Results of a major ambulatory oral surgery program using general inhalational anesthesia on disabled patients. *Med Oral Patol Oral Cir Bucal* 2009;14:e605-11.
8. Jankauskiene B, Virtanen JI, Kubilius R, Narbutaite J. Oral health-related quality of life after dental general anaesthesia treatment among children: a follow-up study. *BMC Oral Health*. 2014;4:81.
9. Bello LL. A Retrospective study of pediatric dental patients treated under general anesthesia. *Saudi Dent J* 2000; 12: 10-15.

10. Jamjoom MM, AL-Malik MI, Holt RD. Dental treatment under general anaesthesia at a hospital in Jeddah, Saudi Arabia. *Int J Paediatr Dent* 2001; 11: 110-116.
11. Harrison MG, Roberts GJ. Comprehensive dental treatment of healthy and chronically sick children under intubation general anaesthesia during a 5-year period. *Br Dent J* 1998; 184:503–6.
12. Maccormac C, Kinirons M. Reasons for referral of children to a general anaesthetic service in Northern Ireland. *Int J Paediatr Dent* 1998; 8: 191-6.
13. Al-Malik MI, Al-Sarheed MA. Comprehensive Dental Care of Pediatric Patients Treated Under General Anesthesia in a Hospital Setting in Saudi Arabia. *The J of Contemp Dent Pract* 2006; 7: 1-9.
14. Holt RD, Rule DC, Davenport ES. The use of general anesthesia for tooth extraction in children in London: a multi-centre study. *Br Dent J* 1992; 173: 333-9.
15. Tyrer GL. Referrals for dental general anaesthetics—how many really need GA? *Br Dent J* 1999; 187(8): 440-3.
16. Jameson K, Averley PA, Shackley P. A comparison of the 'cost per child treated' at a primary care-based sedation referral service, compared to a general anaesthetic in hospital. *Br Dent J* 2007; 203: 1-6.
17. Enever GR, Nunn JH, Sheehan JK. A comparison of postoperative morbidity following outpatient dental care under general anaesthesia in paediatric patients with and without disabilities. *Int J Paediatr Dent* 2000; 10:120-5.
18. Atan S, Ashley P, Gilthorpe MS. Morbidity following dental treatment of children under intubation general anaesthesia in a day-stay unit. *Int J Paediatr Dent* 2004; 14: 9–16.
19. Davies C, Harrison M, Roberts G. Guideline for the Use of General Anaesthesia (GA) in Paediatric Dentistry. UK National Clinical Guidelines in Paediatric Dentistry 2008; May:1-11.
20. Tochel C, Hosey M, Macpherson L. Assessment of children prior to dental extractions under general anaesthesia in Scotland. *Br Dent J* 2004; 196: 629-33.
21. Hamdan MA. Caries experience among 6 and 12 year-old school children in Jordan. *Dirasat, Medical and Biological Sciences* 1997; 24 (2): 112-21.
22. Rajab LD, Hamdan MAM. Early childhood caries and risk factors in Jordan. *Com dent health* 2002; 19: 224-9.
23. Jamieson LM, Thomson KF. Dental general anaesthetic trends among Australian children. *BMC Oral Health* 2006; 6 (16): 1-7.
24. Vermeulen M, Vinckier F, Vandenbroucke J. Dental general anesthesia: clinical characteristics of 933 patients. *ASDC J Dent Child* 1991;58(1): 27-30.
25. Sánchez-Martin JR, Fano E, Ahedo L. Relating testosterone levels and free play social behavior in male and female preschool children. *Psychoneuroendocrinology* 2000;25:773-83.
26. Scerbo S, Kolko DJ. Salivary testosterone and cortisol in disruptive children: relationship to aggressive, hyperactive, and internalizing behaviors. *Journal of The American Academy of Child and Adolescent Psychiatry* 1994;33:1174-84.
27. Legault JV, Diner MH, Auger R. Dental treatment of children in a general anaesthesia clinic: review of 300 cases. *J Can Dent Assoc (Tor)* 1972;38:221–4.
28. Grytten J, Holst D, Dyrberg L, Faehn O. Some characteristics of patients given dental treatment under general anesthesia. *Acta Odontol Scand.*1989;47:1–5.
29. Tarján I, Mikecz G, Dénes J. General anaesthesia of outpatients in pedodontics. *J Int Assoc Dent Child* 1990;20:59–61.
30. Nunn JH, Davidson G, Gordon PH, Storrs J. A retrospective review of a service to provide comprehensive dental care under general anesthesia. *Spec Care Dentist* 1995, 15:97–101.
31. Haubek D, Fuglsang M, Poulsen S, Rølling I. Dental treatment of children referred to general anaesthesia – association with country of origin and medical status. *Int J Paediatr Dent* 2006;16:239–46.
32. Bohaty B, Spencer P. Trends in dental treatment rendered under general anesthesia, 1978 to 1990. *J Clin Pediatr Dent* 1992;16: 222-4.
33. Tsai CL, Tsai YL, Lin YT. A Retrospective Study of Dental Treatment under General Anesthesia of Children with or without a Chronic Illness and/or a Disability. *Chang Gung Med J* 2006; 29: 412-8.
34. Rajab LD. Paediatric dental general anaesthesia: Clinical Evaluation of Day-Stay Care Patients at The Jordan University Hospital. *Alexandria Dent J* 1996; 21: 85-96.
35. Rantavuori K. Aspects and determinants of children's dental fear. University of Oulu, Faculty of Medicine, Institute of Dentistry: PhD thesis; 2008.
36. Lahti S, Vehkalahti MM, Nordblad A, Hausen H. Dental fear among population aged 30 and older in Finland. *Acta Odontol Scand* 2007;65:97–102.
37. Kelly M, Steele J, Nuttall N, Bradnock G, Morris J, Nunn J, Pine C, Pitts N, Treasure E, White D. Adult Dental Health Survey. Oral Health in the United Kingdom 1998. Office for National Statistics. London: The Stationary Office; 2000.
38. Savanheimo N, Vehkalahti MM, Pihakari A, Numminen M. Reasons for and parental satisfaction with children's dental care under general anaesthesia. *Int J Paediatr Dent* 2005, 15:448–54.
39. Averley PA, Girdler NM, Bond S. A randomised controlled trial of paediatric conscious sedation for dental treatment using intravenous midazolam combined with inhaled nitrous oxide or nitrous oxide/sevoflurane. *Anaesthesia* 2004; 59: 844–52.
40. Ibricevic H, Al-Jame Q, Honkala S. Pediatric dental procedures under general anesthesia at the Amiri Hospital in Kuwait. *J Clin Pediatr Dent* 2001; 25: 337-42.

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