



Evaluation of Dental Treatments in Children Performed under General Anesthesia

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ABSTRACT

Objective: This retrospective study aimed to evaluate the characteristics and treatment modalities of children whose dental treatments were performed under general anesthesia.

Methods: The records of 196 children (107 boys and 85 girls), who were treated by the same pediatric dentist between May 2013 and November 2016, were evaluated in this study.

Results: The mean age was found as 5 ± 1.9 years. Before the treatment procedure, the mean number of dental caries was calculated as 11 ± 4.09 . The frequency of different treatment modalities performed for the primary teeth was as follows: restorations (36%), extractions (35%), pulp treatment and restorations (24%), and fissure sealants (5%). According to the records on 97 permanent teeth, which was equal to 4.6% of all treated teeth, 15 extractions and 82 restorations were performed during the procedure. It was also observed that after the general anesthesia procedure the need for dental treatments could be managed under clinical conditions for all children, except for two of them who needed repeat therapies under general anesthesia.

Conclusion: Given that oral health is closely related to quality of life in children and that children who are not cooperative to perform dental treatments due to excessive dental anxiety, general anesthesia can be indicated for them if they have a high number of caries during early childhood.

Keywords: General anesthesia, children, dental treatments under general anesthesia

Introduction

Dental caries are considered as the most common chronic disease (1). Untreated dental caries not only increase the risk of caries for the patient, but also lead to increased treatment costs and a reduced quality of life (2). Preventive treatments such as local fluoride application or atraumatic restorative treatments (ART; Atraumatic Restorative Treatment) with glass ionomer cements cause a delaying effect only on initial lesions (3, 4). However, the children with painful early childhood caries (ECC; Early Childhood Caries) in need of urgent treatment should be provided with a quality oral-dental health service and a physical and medical safety during the presentation of this service, especially when accompanied by mental, emotional, physical and

medical obstacles (5, 6). In children, caries which start during "infancy and pre-school" and are called as ECC are commonly encountered. The more aggressive and faster progressive form of ECC is called as Severe ECC (S-ECC). Because a very complex and difficult treatment process is required in such patients, the American Academy of Pediatric Dentistry (AAPD) considers it appropriate to perform dental treatment in children with such conditions under general anesthesia (7). According to the AAPD guidelines, there is general anesthesia indication not only for ECC cases, but also 1) for patients with physical, emotional, mental or medical disability, 2) for patients in whom local anesthesia cannot be applied due to acute infection, allergies or anatomical disorders, 3) for patients who cannot communicate, are incompatible, are

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extremely scared and who are extremely anxious, 4) for patients with treatments requiring interventional surgical procedures, 5) for patients whose medical and physical risks can be reduced by sedation or general anesthesia, and 6) for patients who need urgent and extensive dental treatment (7).

In addition to life-threatening complications such as bronchospasm, allergy, cardiac arrest, respiratory depression; although it bears the possibility of the complaints such as vomiting, nausea, fever, and pharyngitis, dental treatment under general anesthesia is considered to be an application that increases the quality of life in children (8). Hospitalization, pharmacological agents, general anesthesia team and equipment are needed for general anesthesia which is an expensive and professional approach; however, it is very advantageous since it offers the possibility to perform all dental treatments in one session under optimum conditions and without causing physical, emotional or mental disturbance to the patient (9).

Dental treatment planning for patients with general anesthesia indication may include dental restorations, pulpal treatments, tooth extractions, surgical procedures and protective applications. Although radical solutions are preferred for the dental treatment planning of these patients by taking into account not only the existing problems but also the problems that may occur; after the dental treatment with general anesthesia, such patients with high risk of caries may need to be treated again. (7,10,11).

In this retrospective study, it is aimed to classify and evaluate the dental procedures performed in pediatric patients between May 2013 and November 2016 under general anesthesia according to the teeth and treatment methods. In addition; when these patients had repeated dental treatment needs after the general anesthesia session, it was also aimed to evaluate the selectability of the clinical environment instead of repeated general anesthesia.

Methods

This retrospective study was performed by reaching the records of the patients who were admitted to our clinic and whose dental treatments were performed under general anesthesia between May 2013 and November 2016 by the same physician. Approval was received for the study from Bezmialem Vakif University Non-interventional Clinical Research Ethics Committee (25.01.2017 / 1483). The records of a total of 196 children were included in the study. General anesthesia and dental treatment consents received from their parents are available in the archive. The records of the patients were recorded together with Social Security Institutions and, if available, with additional institutions.

The patients were first examined in terms of their mental, emotional, physical or systemic conditions which were taken into consideration when deciding to perform dental treatments under general anesthesia. For this purpose, the anamnesis and conditions which provided indication for the patients to undergo dental treatment under general anesthesia were obtained and this information was classified according to the guidelines of the AAPD. The records of dental treatments performed during general anesthesia were then compiled for these patients

in whom gender and age were also evaluated. The treatments performed were grouped under the headings of 1) restoration, 2) restoration + amputation, 3) restoration + canal treatment, 4) tooth extraction, and 5) fissure sealant. Thus, information was obtained about the variety of dental treatments performed under general anesthesia. In addition; in order to examine the relationship between the type of dental treatment and the number of teeth, all the treatments were recorded with the number of teeth.

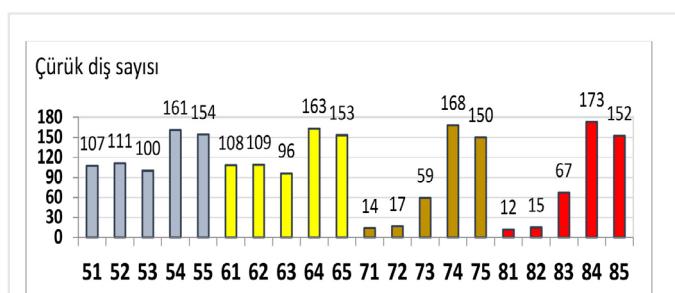
The dental treatments performed after general anesthesia were reached through the records examined according to the order of date, and the presence of recurrent general anesthesia needs and / or the adequacy of the clinical environment for the recurrent dental treatment needs of these patients were evaluated.

Results

Of the 196 children (107 males and 85 females) who underwent dental procedures under general anesthesia, 195 were affiliated with SSI (Social Security Institution), and one had foreign nationality and had no social health insurance. The mean age of these children between the ages of 1.6 and 11.8 was 5 ± 1.9 years and the median value was found as 4.5 years.

When general anesthesia indications were classified according to AAPD criteria; it was found that there were children in whom painful and wide-ranging dental treatments were required to be performed and with whom communication could not be established, who were incompatible, over-fearing and overanxious ($n = 173$; 88.2%); indications such as the presence of a mental or physical disability ($n = 16$), the presence of anaphylactic shock history due to local anesthetics ($n = 1$), the presence of the need for urgent intervention due to a dental trauma ($n = 1$), and the presence of dental caries accompanying interventional surgical procedures ($n = 5$) were also detected.

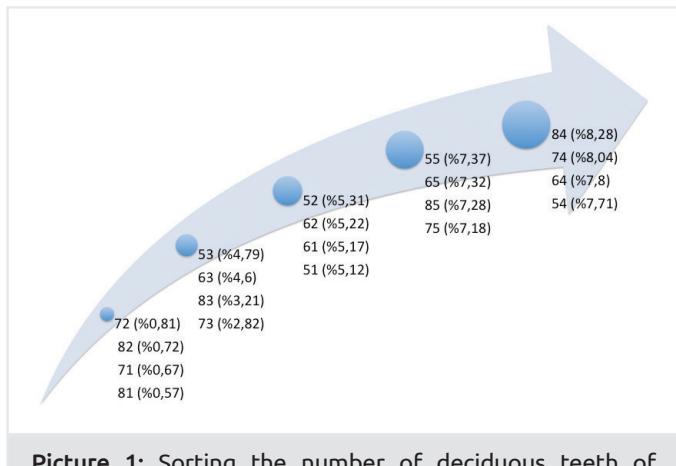
There were no records of any post-interventional anesthetic complications in the epicrisis reports of these patients who were treated under general anesthesia by the same physician (MB) within 42 months and who were at ASA I-II level. Applied dental procedures were examined separately for milk teeth and permanent teeth. According to the records, the average number of decayed teeth before treatment was found to be 11 ± 4.09 . Before performing the procedures, the number of milk teeth numbered



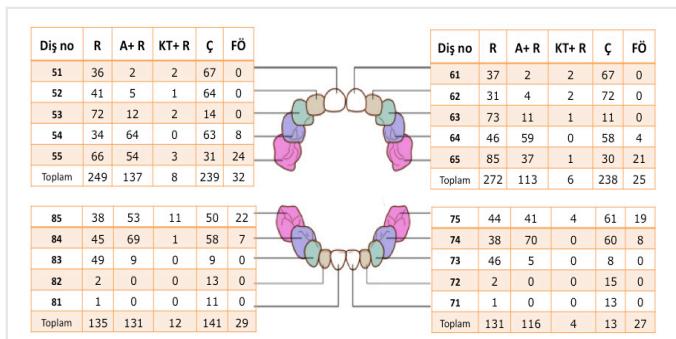
Grafik 1: The number of bruises for numbered primary teeth in the order of FDI

according to the FDI order is shown in Figure 1 according to the total number of caries. According to this, the highest number of caries was seen in first milk molar teeth, followed by second milk molar teeth, and the lowest number of caries was found in the lower milk incisors.

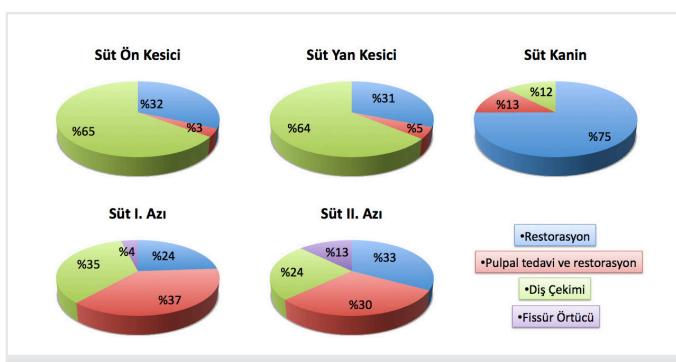
Figure 2 shows the types and number of procedures performed on milk teeth under general anesthesia. These dental treatments performed for milk teeth were first grouped according to dental groups (milk front incisor, milk lateral incisors, milk canine, 1st



Picture 1: Sorting the number of deciduous teeth of primary teeth



Picture 2: Types and number of procedures of dental teeth under general anesthesia. (R; restoration, A+R; amputation and restoration, KT+R; root canal therapy and restoration, Ç; exodontic, FÖ; fissure sealant)



Picture 3: Graphical display of the percentages of each tooth group

milk molar tooth, 2nd milk molar tooth); then, the treatment methods of each tooth group were shown on the graphs in Figure 3 with percentages. Accordingly; it was determined that tooth extraction was mostly performed in the incisor teeth and at least in the canine teeth. While the canines were mostly treated with only restoration, 1st milk molar teeth were treated with restorations along with pulpal treatment. When the treatments of the milk molar teeth were examined, it was found that 2nd molar teeth contained more fissure sealant than 1st molar teeth (Figure 3). As a result of the general examination of the procedures performed, the most common treatments for milk teeth were restoration (36%), tooth extraction (35%), restoration with pulpal treatment (24%) and fissure sealant applications (5%), respectively.

Permanent tooth data showed that a total of 97 caries were treated in 196 patients and this number constituted 4,6% of the total number of decayed teeth. The treatment performed for 15 of these teeth was seen to be ‘tooth extraction’ and it was ‘restoration’ for 82. As a result of the classification of permanent decayed teeth according to tooth numbers; it was observed that the decayed first molars constituted 74% (72/97) of the total number of permanent decayed teeth. This was followed by permanent incisors with 17.5% (17/97), by permanent premolars with 4.1% (4/97) and by permanent second molars (4/97). In addition, only 6 of the total 82 permanent teeth were found to have a pulpal treatment. A total of 74 fissure sealant application for the non-decayed teeth was most commonly seen in permanent first molars (n=58; 78,37%). However, fissure sealant was observed to have been applied in 6 permanent incisors, 2 permanent second molars and 8 premolars.

After the interventions performed with general anesthesia; when the records of re-treated teeth were examined in the patients with clinical follow-ups ranging from 0 to 42 months, one of the 2 patients who needed re-treatment was found to be undergoing general anesthesia after 26 months and the other after 15 months for the necessary procedures. For all other patients, it was observed that dental procedures such as placeholder, local fluoride application, fissure sealant, dental restorations, pulpal treatments and extraction could be applied in clinical setting.

Discussion

General anesthesia is a pharmacological approach that can be applied to perform dental treatments and is classified as one of the advanced behavioral guidance techniques. It is quite common to perform dental treatments under general anesthesia, especially for infants and preschoolers. In support of this, Schroth et al. (7) reported in their study that the mean age of children who underwent dental treatment under general anesthesia was 65 months. Similar to the results of the study of Schroth et al. (7), the mean age has been determined to be 60 months (5 years) in this study.

According to the results of the study that Milsom et al. (12) conducted in the UK, the presence of dental anxiety is very common, especially in 5-year-old children. According to AAPD

criteria, there is general anesthesia indication for the dental treatments in patients who cannot communicate, are inconsistent, are extremely scared and are extremely anxious (7). Considering the average age of children in the study; this condition is consistent with the condition of 'children in whom painful and wide-ranging dental treatments were required to be performed and with whom communication could not be established, who were incompatible, over-fearing and overanxious', which was a general anesthesia indication for 88% of the patients. Similarly, there are other studies reporting that each of the factors defined as "communication can not be established", "incompatible" and "requiring wide-ranging dental treatments" may be indicative of general anesthesia alone or together (13, 14).

It is known that untreated dental caries affect the quality of life negatively in the presence of dental anxiety associated with parental anxiety, bad dental experiences and non-regular dental visits (15, 16). However, the questionnaire of Oral Health-Related Quality of Life showed that oral health-associated quality of life of the children treated under general anesthesia significantly increased following the treatment (2, 17). Although the general anesthesia procedure requires a trained team and a well-equipped environment, it is a method that is more commonly recommended than sedation in order to perform easy and effective procedures, especially if complicated and long-term dental treatment is needed, in child patients in whom cooperation can not be established. The study by Ayhan et al. (18) which emphasizes the increase in weight and height after the treatment of dental caries in early childhood clearly reveals the effects of caries on the life and development of children. The high number of decayed teeth and dental procedures to be performed reveals the importance of the indication of general anesthesia. In this retrospective study, in which the mean number of decayed teeth was determined to be 11; it was clear that the high number of dental procedures needed to be performed in patients was effective for the indication of general anesthesia.

During the evaluation of oral health, it is common to specify the dmft (d-decayed, m-missing, f-filled, t-teeth) value by taking into consideration not only the decayed teeth, but also the extracted and filled teeth (19). In this study, the patient's dmft value could not be calculated because the retrospective records were examined and only the information about the number of caries was reached. However, the number of current decayed teeth obtained from children is thought to be similar to the dmft value. It is quite likely that most patients in this group treated under general anesthesia had no previous dental treatment. In support of this, Jankauskiene et al. (20) presented the values of $d=12,1\pm3,9$, $m=0,6\pm1,5$, $f=0,2\pm0,8$ for dmft value (12.9 ± 3.5) that was calculated before the dental procedures with general anesthesia. Similar to this patient group in which the number of decayed teeth was very high, the dmft value was reported to be 10.47 ± 3.98 in another group consisting of 441 children with a mean age of 5.91 ± 2.53 and was treated under general anesthesia (21). These studies also show great similarity with the value of $d = 11 \pm 4.09$, which was obtained here. In another study evaluating children who were under 8 years of

age and were treated under general anesthesia, it was reported that the dmft value was 8.55 in a group of children with $n=31$, and 8.89 in the other group with $n=19$ (2). Even if the results seem to be quite close; while evaluating the results of studies conducted on a different society, it should be kept in mind that dental caries is a multifactorial phenomenon and the incidence is related to socio-economic factors. Another detail to be taken into consideration regarding the aforementioned study of Klaassen et al. is that while the mean age ($n=50$) of the patients was 4.06, this value was 5 years in this retrospective study (2). With the growing average age, the increase in the number of teeth that are likely to have caries in children can support the high number of caries. However, in a group with a mean age of 5 years, the milk dentition period seems to be dominant. This can be seen as a reason for the fact that only 4.6% of the number of treated teeth specified in the study consisted of permanent teeth.

Conclusion

It is a great advantage that dental treatments which are necessary to improve the quality of life of children can be performed under general anesthesia, and although the number of caries is high, it is appropriate to be preferred for patients and children with special conditions that cannot be treated under clinical conditions.

Ethics Committee Approval: Ethics committee approval was received

for this study from the ethics committee of Bezmialem Vakif University Ethics Committee for Non-invasive Studies (25.01.2017-1483).

Informed Consent: Written informed consent was obtained from the parents of the patients who participated in this study.

Peer-review: Externally peer-reviewed.

Conflict of Interest: The authors have no conflicts of interest to declare.

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