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The Oral Health Outcomes of children treated after General Anaesthesia - A 3 year follow up

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Abstract

Introduction: Dental full-mouth rehabilitation under General anaesthesia improves the quality of life, growth and overall social well-being of young children. Caries relapse is a common occurrence which is not addressed. This research aims to determine the oral health outcomes of children treated after General Anaesthesia. **Material and method:** A total of 45 individuals(31 males and 14 females) who had full mouth rehabilitation done under General Anaesthesia participated in the study. A questionnaire enquiring about the demographic, socioeconomic status, food habits and oral hygiene habits was given to each parent as they waited for their appointment. The oral hygiene was then evaluated by a single evaluator and OPGs were taken to determine the extent and progression of any new carious lesion. **Results:** The Oral Hygiene Score Simplified (OHI-S) was seen to be an average of 2.5±1.3, which meant the hygiene was relatively fair. The mean restorative index (ri) was 69.79±31.5%. There was a significant increase in the surfaces with new caries lesions which averaged 2.3±1.5. There was a slight increase in the DMFS score of 4.6% with an SD of ±4.3%. The RI was seen to be 15.15% with an SD of ±13.2%. The surfaces with new caries lesions on permanent teeth were seen to increase by 4.45±1.3. **Conclusion:** Treatment under GA does not mean the individual is devoid of the disease. Children with Early Childhood Caries (ECC) are more susceptible to caries. Regular dental checkups and maintenance of good oral hygiene are vital in reducing caries risk.

Introduction:

Dental treatment under General Anaesthesia (GA) is when the patient undergoes dental treatment while unconscious(Lee et al. 2009). It is usually preferred in cases of severe dental anxiety, patients requiring extensive dental procedures, special needs and young children who are unable to cooperate(Berg and Slayton 2015) and in severe anxiety(Marimuthu 2021). In children, the primary goal of treatment under anaesthesia is to address oral health issues and improve

the child's overall well-being (Worthen and Mueller 2000). If left untreated, it can lead to severe health complications. By undergoing treatment and addressing the child's complaint, complications such as infection, abscesses, tooth loss, and damage to the teeth or surrounding tissue can be avoided which can impact the child's social and overall health(Amin et al. 2010).

Dental treatment under anaesthesia has a beneficial psychological impact on children who receive it, fostering a positive attitude towards oral health among both children and their parents(Kumar et al. 2019; Nagarajappa et al. 2013). Existing literature shows that the overall health of a child is improved with treatment under GA(Oh et al. 2018). They start eating well and attending school regularly the children were found to exhibit a behaviour change such as increased frequency of brushing and reduced consumption of high-sugar foods. Although GA carries some inherent risks, its use in hospitals and operating rooms has been seen to be safe and reliable(Lin et al. 2021). Over the past 30 years, there has been a growing trend among pediatric dentists to employ this approach and has also gained popularity among parents.

Studies have shown that despite being treated under GA, the children failed to show up for their follow-up visits- both short (2 weeks) and long term which resulted in caries recurrence and failure of disease control(Kakaounaki et al. 2011). Caries relapse occurred between 20-75% which in some cases required a second GA. Very few existing studies have reported the long-term outcomes post-treatment of GA and had inconclusive outcomes due to the lack of follow-up and poor attendance rates(EzEldeen et al. 2015). This study aimed to assess the Oral Health Outcomes of children treated after General Anaesthesia for three years.

Material and Method:

Study design and settings

In this cross-sectional study, the data of the children treated under General Anaesthesia were collected from September 2022 to May 2023 at the Department of Preventive and Pediatric Dentistry of a private institute and assessed. Ethical clearance for the study was obtained from the Institutional Review Board. Informed consent was obtained from each participant.

Participants

Patients who received dental treatment under GA between July 2019 and May 2020 were contacted to participate in this study. The inclusion criteria were: a) Children younger than 10 years, b) history of dental treatment under GA at least 2 years before this study c) healthy and uncooperative children. The only exclusion criteria were the inability to contact the parents or the unwillingness to participate in the study. The participants were first asked to fill out a questionnaire and then oral examination and radiographs were taken by a single examiner.

Data collection

Data regarding the current oral health status and attitude towards dental treatment were obtained through a questionnaire and oral examination with mandatory xrays to observe and determine the progression or start of proximal caries. All procedures were conducted by a single evaluator blinded to the participants' previous dental and medical histories. Calibration of the examiner was performed before the commencement of the study. Intra- and inter-observer agreement was measured for the radiographic assessment using Cohen's Kappa test. The participant's medical and dental records, oral health status and behaviour were assessed. The guardians of the participants were also interviewed using a previously validated survey which enquired about the demographic, socioeconomic status, food habits and oral hygiene habits.

Statistical analysis

Statistical analysis was conducted using G* Power 3.1.2 Data are presented as percentage (%) and mean ± SD. The Shapiro-Wilk test was used to assess the normal distribution. To assess the association between independent categorical variables and dependent variables a linear regression analysis was used and statistical significance was set to 5%.

Results

Study samples

Initially, 120 full medical records were retrieved and 112 met the inclusion criteria. Of the 112, 45 agreed to participate in this study by completing the questionnaire and arriving for a clinical examination.

The follow-up ranged from 3 to 5 years. Of the 45 participants in the study, 31 were males and 14 were females with a mean age of 11±2.4 years. The individuals who completed the questionnaire as well as the clinical examination were only taken for the study. The usual reason for not participating in the study was lack of time. The parents claimed to have work or that the child could not miss school. The majority of them believed that the child would not require dental visits as the pain was treated and cured.

The oral habits and dietary schedule of the participants are given in Table 1. The majority of the participants reported brushing once a day (55%) while 45% reported to be brushing twice a day. All participants used fluoridated toothpaste as recommended by the health care professional but none used systemic fluorides. 34% of the participants had received fluoride application 6 months after the procedure. Only 15% of participants used dental floss. The majority of the participants had a high intake of sugar in solids (55%) and liquids(64%). The majority of the participants (85%) reported back two weeks after the procedure for a follow-up but this number declined to 25% in a year. Only 10.5% of the participants frequently came for checkups. This is in correlation with negligence and confidence in the total eradication of the disease after the procedure was carried out. 74% of the participants missed their follow-up appointments and did not schedule a reappointment.

Clinical examination to determine the oral health of the individuals was conducted on all the participants (n=45). The Oral Hygiene Score Simplified (OHI-S) was seen to be an average of 2.5±1.3, which meant the hygiene was relatively fair. The dmfs score was 28.8±16.3% increase. Where there was an increase in the decay score of 5.6±5.9. The mean ri was 69.79±31.5%. There was a significant increase in the surfaces with new caries lesions which averaged 2.3±1.5. There was a slight increase in the DMFS score of 4.6% with an SD of ±4.3%. No missing teeth were seen as the teeth were just erupting into the oral cavity. The RI was seen to be 15.15% with an SD of ±13.2%. The surfaces with new caries lesions on permanent teeth were seen to increase by 4.45±1.3. Which is lesser compared to the primary teeth due to the period of observation and as the teeth were newly erupting into the oral cavity.

Table 1: Oral Hygiene, dietary habits and frequency of attending dental appointments

Questionnaire	**Number of participants**	**pvalue**
Oral hygiene and dietary habits: Brushing frequency (Twice a day)	(%) 45	 0.45
Use of fluoride toothpaste	100	-
Professional gel application 6 months after procedure	34	0.67
Usage of dental floss	10	0.09
Daily consumption of sugary snacks	55	0.99
Daily consumption of juices or beverages	64	0.99
Dental attendance: Attendance to 1-week follow up after GA	85	0.76
A year follow up after GA	25	0.57

Questionnaire	Number of participants	pvalue
More than a year follow up after GA	10.5	0.07
Missed follow up appointments	74	0.86

Table 2: Analysis of OHI, dmfs/DMFS and ri/RI scores

Index	Score	pvalue
OHI-S	2.5±1.3	
dmfs (%)	28.8±16.3	0.89
d	5.6±5.9	0.09
m	12.1±9.0	0.07
f	23.6±5.5	0.1
ri(%)	69.79±31.5	0.6
Surfaces with new caries lesions in primary teeth	2.3±1.5	0.03*
DMFS	4.6±4.3	0.13
D	4.9±5.08	0.7
M	0.00±0.000	0.07
F	1.35±0.98	0.04*
RI(%)	15.15±13.2	0.09
Surfaces with new caries lesion on permanent teeth	1.45±0.3	0.9

(OHI- Oral Hygiene Index, D/d- decayed teeth, M/m- missing teeth, F/f- filled teeth, RI/ri- Restorative Index)

Discussion

This research studied the long-term end effects of full-mouth rehabilitation in children under GA. Most studies reported similar findings but reported an inability in having a long-term follow-up (Graves et al. 2004). It was observed that most parents were not interested in follow-ups after the procedure as they believed in the full treatment of the disease and that there would not have a recurrence(Vadiakas 2008). That was the main cause of the loss of follow-up. There was a lack of awareness among parents that frequent check-ups are essential in the prevention and cessation of the occurrence of caries(Li and Wang 2002).

Various pieces of evidence in the literature show that the recurrence of caries occurs in children who are affected by ECC and who received treatment under GA(Graves et al. 2004; Almeida et al. 2000; Berkowitz et al. 2011). One study reported an increase in caries recurrence in 79% of ECC cases(Almeida et al. 2000). An 8-year cohort study was conducted which showed

an association between caries occurrence in primary and permanent teeth and it was observed that children affected by ECC at a young age were three times more likely to develop caries(Li and Wang 2002) this was observed to be due to increased consumption of sugars and irregular brushing habits. The present study shows that there is still a risk for children to experience caries despite undergoing treatment under GA. Only 10.5% of individuals reported to be undergoing regular dental follow-ups. 74% of the individuals missed their appointments. It was found that the majority of the patients had a fair oral hygiene score (2.5±1.3). There was a significant increase in the number of surfaces with new caries lesions in primary teeth. Though the number of new caries lesions on the permanent surfaces was not significant, there was an occurrence of caries on the permanent first mandibular molars more often than maxillary first molars. The results of this study showed that the oral hygiene health practices of children and the occurrence of caries were influenced by parental attitude and guidance(EzEldeen et al. 2015). Frequent visits to the dentist were also observed to be a factor in preventing and reducing the recurrence of caries. These parents were more interested and compliant towards the usage of preventive measures and oral practices compared to those who were inconsistent in their checkups (Casamassimo et al. 2009).

The relapse rate of dental caries was observed to be high in the present study which proves that ECC-affected children are not exempt from recurrence of the disease(Davies 1998). Due to this fact, authors these days prefer a more aggressive mode of treatment which consists of full-coverage crowns and extraction(Nelson and Webb 2019).

The study has been restricted to one area with a limited number of individuals participating in the study. Further research needs to be conducted with a larger sample size to conclude the recurrence of caries. The advantage of this study over others was that pre and post-orthopantomogram (OPG) were also taken to observe the presence of proximal caries. This study could not have a control group, even then it sheds light on the oral health outcomes of healthy children.

Conclusion

In conclusion, this cross-sectional study with lengthy follow-ups discovered that very young infants who were uncooperative and had ECC and treated by GA had poor oral health-related outcomes if they did not come for frequent checkups. Additionally, irrespective of the type of dentition primary or permanent), lack of checkups and a long time period since GA was performed was linked to a higher risk of acquiring new caries.