Factors To Be Evaluated in Children Undergoing Dental Treatment Under General Anaesthesia - A Retrospective Study

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Abstract

Introduction: General anaesthesia is the reversible state of unconsciousness that results in coma with loss of protective reflexes. GA in dentistry is the most cost effective and practiced mode of treatment. A definite group of patients who are not cooperative to the normal treatment will be treated only by giving general anesthesia. The potential risk factors for the usage of GA are emergency surgery, anaesthesiologist error, fluctuations in Blood pressure and Heart rate, Palor, Jaundice, Cyanosis and cardiovascular and pulmonary problems. Aim: The aim was to examine factors evaluated among children undergoing general anaesthesia for dental rehabilitation. Materials and methods: The study was implemented in a private dental institution, Chennai, India. Ethical approval was obtained from the Institutional review board prior to the start of the study. Total 140 children treated under GA were included in the study. Data was collected with following parameters like age, Gender, pallor, Jaundice, cyanosis, Blood pressure, Respiratory system examination, Cardiovascular system examination. The collected data was divided into 3 groups 0-5, 6-10 and 11-15 years and was analysed using SPSS statistical software. Data analysis done using chi square test and pearson correlation was done. p value < 0.005 was considered statistically significant. Results and Discussion: In a total of 140 patients, different factors such as pallor, jaundice were taken in consideration and the analysis was done with comparison of ages. It is seen that most of the children who are accepted for the procedure are children in the age group of 0-5 years, followed by 6-10 years and the least percentage of acceptance is 11-15 years. Conclusion: Within the limits of the study, some factors have been examined by the dental practitioner before General Anesthesia. Majority of the children show the absence of the pallor, jaundice and cyanosis.

Keywords- General Anesthesia, Children, Dental care, Novel analysis

Introduction

General Anaesthesia is the administration of anaesthetic agents in which the controlled state of unconsciousness results in coma with loss of protective reflexes. It allows the surgeon to perform surgery without pain to the patient during the procedure.(1) According to the American Academy of Pediatric Dentistry, children who are not cooperative to the routine dental treatment, or with severe disabilities and in the case of invasive dental procedures in young children like rehabilitation procedures, early childhood caries(ECC), children who are not able to open their mouth (Trismus) , and those undergoing laryngoscopy and endotracheal intubation of dental trauma can be treated only by GA .(2)
General anaesthesia in dentistry helps to deliver the treatment in a safe, convenient and efficient way and also gives a high quality treatment in one visit, with less stress to the child as well as the dentist and also reduces the factors that threaten the child’s overall health which results in mortality and morbidity.(3)

Children treated will most often undergo full mouth rehabilitation or different procedures like pulpectomy, stainless steel crowns, extractions and restorations.(4) The optimal combination of drugs for both children and adults should be selected by anesthetist and operating practitioner depending upon the procedure to be performed on the patient. GA can be administered via inhalation, intravenous, intramuscular or subcutaneous, oral and rectal route.(5) In case of children who mostly develop fear for injections, inhalation anesthesia induced by halogenated volatile anesthetics can be used.(6)

Before deciding the treatment that involves the administration of GA, initial examination should be done for the patient by recording the history through physical examination and their past history. Physical examination shows whether the patient is fit to undergo dental treatment under GA. The potential risk factors for the usage of GA are emergency surgery, any error in the administration of GA, fluctuations in Blood pressure and Heart rate, pallor, Jaundice, Cyanosis and cardiovascular and pulmonary problems.(7) Patients with hepatocellular diseases at any level of jaundice are more acutely affected than the patients with bile duct obstruction.(8) Pallor should be examined, if a child has anemia, it one of the most ignored conditions in surgical cases. It is usually an iron deficiency and multifactorial in which inflammation is most commonly seen.(9) The main factor in the case of anemia is blood loss, so the child should not be treated under general anesthesia. Young children are easily and most frequently prone to infections in the upper respiratory tract, showing the symptoms of runny nose, cough and fever.(10) In the case, children undergoing GA have an increased risk of perioperative laryngospasm, bronchospasm and affects the pulmonary function of the patient where both the oxygenation and elimination of carbon dioxide are disturbed.(11,12) In these types of cases, the surgery should be delayed, and the patient should be kept under medications.(13)

When it comes to the dental practitioner, recording proper oral and general examination and scheduling a proper treatment plan is essential. (14) The practitioner should be well known about the psychological behavior of a child patient. The anesthesiologists should perform the procedures with caution, to avoid the risk of adverse effects.(15) The numbers of pediatric patients in dentistry who require dental rehabilitation under general anesthesia are increasing, which is apparently associated with more risks and complications.(16,17)

The aim of the study is to examine factors evaluated among children undergoing general anaesthesia for dental rehabilitation.

**Materials and methods**

The retrospective study was conducted in a private dental institution, Chennai, India. Ethical approval was obtained from the Institutional review board prior to the start of the study. The data was collected from records of the children less than 15 years of age who were treated under general anesthesia between September 2020 to January 2021. A total of 140 children treated under general anesthesia were included in the study. Records with incomplete data were excluded from the study. Data collected with following parameters like age, Gender, pallor, Jaundice, cyanosis, Blood pressure, Respiratory system examination, Cardiovascular system examination. The collected data was divided into 3 groups 0-5, 6-10 and 11-15 years and was analysed using SPSS statistical software. Data analysis done using chi square test and pearson correlation was done. p value < 0.05 was considered statistically significant.

**Results**

A total of 140 children treated under general anesthesia were included for analysis in the present study. The mean age of the children who underwent dental treatment under general anesthesia was 1.73 ± 0.80 years. The demographic details of the participants are tabulated in Table 1. Association between the pallor, jaundice, cyanosis, blood pressure, RS examination, CVS examination showed a significant difference with age. In the 0-5 years age group, with respect to pallor, 80.58% of the subjects had no signs of pallor and 2.88% had signs of pallor. In the case of jaundice, 82.73% had no signs of jaundice and only 0.72% had signs of jaundice.
In case of cyanosis, 82.01% had no signs of cyanosis and only 1.44% had signs of cyanosis. With respect to blood pressure, 79.56% had normal blood pressure and 3.60% had abnormal blood pressure. In the case of systemic examinations, the majority of the population were normal.

<table>
<thead>
<tr>
<th>Total</th>
<th>N= 140</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>52.5% (n=73)</td>
</tr>
<tr>
<td>Female</td>
<td>47.5% (n=67)</td>
</tr>
<tr>
<td>Age</td>
<td>Mean + Standard deviation</td>
</tr>
</tbody>
</table>

**Table 1**: Table represents the total number of children included in the study, percentage distribution of the gender and the mean value of the age of the children.

**Figure 1**: Bar graph shows the percentage distribution of Pallor among the children of different age groups, only in the age group of 1-5 shows the presence of pallor of about 2.88% (n=4) whereas the other age group shows the absence of pallor. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000(p<0.05), hence significant, thus showing that the 1-5 age group have the signs of pallor than other age group.
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Figure 2: Bar graph shows percentage distribution of jaundice among the children of different age groups, 0.72% is seen in both the age group of 1-5 years (n=1) and 6-10 years (n=1) which shows the sign of jaundice. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000 (p<0.05), hence significant, thus showing that 1-5 years and 6-10 years shows the equal percentage.

Figure 3: Bar graph shows percentage distribution of Cyanosis among the children of different age groups, Out of the 140 cases, cyanosis is very rarely seen, it is observed in the age group of 1-5 which is nearly 2.44% (n=2) and it is absent in the age group of 11-15 age group. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000 (p<0.05), hence significant, thus showing that the 0-5 age group have the signs of cyanosis than other age group.
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**Figure 4:** Bar graph shows the percentage distribution of blood pressure among the children, out of which the majority of children are normal, whereas 0.72% in the age group 6-10 and 11-15 years (n=1) and 2.6% of 0-5 years shows abnormal blood pressure. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000(p<0.05), hence significant, thus showing that 0-5 years shows the abnormal blood pressure.

**Figure 5:** Bar graph shows percentage distribution of Respiratory system among the children of different age groups, the results show the abnormal condition of 4.23% (n=2) in 1-5 years, 0.72% (n=1) in the age group 11-15 years. Chi square test was done and association was found to be statistically significant. Pearson chi square value: 100.00; p: 0.000(p<0.05), hence significant, thus showing that 1-5 years shows the abnormal condition.
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Discussion

In this study, the majority of patients encountered were the children of 0-5 years age group. The level of child's cooperation, the risk of GA modality, the psychological impact of GA on the child and physical examinations such as pallor, jaundice, cyanosis, Respiratory system and cardiovascular system are the factors that should be examined before general anesthesia.

The current study shows that Pallor among the children of different age groups, only in the age group of 0-5 shows the presence of pallor of about 2.88% whereas the other age group shows no signs of pallor. A study by Murphy et al (18) states that, most of the children does not show the signs of pallor and says that it one of the most ignored conditions in surgical cases, whereas the Cantekin et al (19) contraindicated that majority of the children will shows the sign pallor, invasive dental procedures involving blood loss may affect the child.

The most important factor that affects in majority of children is jaundice, which is clinical pathophysiological condition characterized by the increased level of serum bilirubin level due to bile duct obstruction.(20) The study done by Weddell (21) showed that patients with jaundice are prone to develop nutritional deficiency, acute renal failure, sepsis and multiorgan failure. Patients with obstructive jaundice and the eventual mortality is 70% -80% in those who develop it, whereas in our study About 0.72% is seen in both the age group of 0-5years and 6-10years.

Cyanosis is a very rarely seen factor in case of children, where 1.44% is seen in 0-5 years of age and it is absent in the age group of 6-10 years and 11-15 age group. The earlier study showed that 72.1% of the patients did not have the sign of cyanosis remaining 27.9% having the sign of cyanosis, dehydration should be avoided. (22)

The study shows abnormal condition of 4.23% (n=6) in 0-5 years, 0.72% (n=1) in both the age group 6-10 and 11-15 years, a study done by Al Eheided et al and Herman et al (23) says that young children are easily and
most frequently prone to infections in the upper respiratory tract, showing the symptoms of runny nose, cough and fever. In this case, children undergoing GA have an increased risk of perioperative conditions.

The cardiovascular examination shows that the majority of the children have normal condition, 2.88% show abnormal condition. The recent study says that the child with symptoms of heart disease do not need a cardiology reference if they are fit and healthy. However, clearance must always be given by an anaesthesiologist as the dental surgeon will not have full knowledge of anaesthetic effects and surgical procedures. Studies suggested that parents and children are more likely to engage in positive oral hygiene behaviors after when the child undergoes the comprehensive dental treatment under general anaesthesia. The children of a very young age who have been treated under GA have exhibited positive behavior at the following procedures. Studies suggested that parents and children are more likely to engage in positive oral hygiene behaviors after when the child undergoes the comprehensive dental treatment under general anaesthesia. (25) Children of a very young age who have been treated under GA have exhibited positive behavior at the following recall appointments.

General anesthesia should be evaluated carefully by taking history and through physical examination. Physical examination shows whether the patient is fit to undergo dental treatment under GA.

**Conclusion**

Within the limits of the study, some factors have been examined by the dental practitioner before General Anesthesia. Majority of the children show the absence of the pallor, jaundice and cyanosis.

**Reference**

18. Murphy MG, Fields HW Jr, Machen JB. Parental acceptance of pediatric dentistry behavior management techniques.
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