



Commonly Used Induction and Maintenance Drug for Children Treated Under General Anesthesia - A Retrospective Study

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| Article History | Abstract |
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| <p>Received: 20 June 2023 Revised: 18 Sept 2023 Accepted: 13 Dec 2023</p> <p>CC License CC-BY-NC-SA 4.0</p> | <p>Introduction: General anesthesia is used to produce amnesia and analgesia with or without muscle paralysis. Pediatric General anesthesia is given for children to perform complicated procedures. The most commonly used inducing agent is propofol which is used for its high performance and among the maintaining drugs is sevoflurane which has high blood and tissue solubility. Aim: To find out the commonly used inducing and maintaining drug for children treated under General anesthesia. Materials and Methods: Saveetha Dental College provided data, which was then transferred to an excel file. The spss software was used for statistical analysis. Results: On the data collected it was observed that use of propofol is the most common drug among inducing agents and the most commonly used maintenance drug is sevoflurane for maintaining General anesthesia. Conclusion: According to the findings, propofol is the most regularly used inducing drug, whereas sevoflurane is the most commonly used maintenance drug.</p> <p>Keywords: General Anesthesia, Children, Propofol, Sevoflurane</p> |

Introduction:

General anesthesia is a state produced when a patient receives medication to produce amnesia and analgesic with or without receiving muscle paralysis. Anesthesia enables a patient to tolerate surgical procedures(1). They are commonly administered via iv or inhalation. Under General anesthesia, the patient cannot feel pain and may also have temporary amnesia (2). There are a number of side effects associated with general anesthetic such as temporary confusion, dizziness, nausea and vomiting (3).

Studies show that children who are anxious and are not cooperative are usually treated with General anesthesia for complicatory procedures and to avoid complications(4). When providing general anesthesia to children, it is critical to have a thorough awareness of the physiological, pharmacological, and psychological distinctions that exist between children and adults(5). Infants and young children respond to general anesthesia differently than adults. Different factors influence the reaction, such as body composition, protein binding, body temperature, liver and kidney function, and so on(5).

The induction of anesthesia may be the most distressing procedure where children experience pain and anxiety(6). Many studies have shown that children who are extremely anxious and fearful during anesthetic procedures are likely to create adverse effects such as delirium, negative postoperative behavioral changes etc(7). There are various drugs that are used for induction and include propofol, midazolam, ketamine, chlorate hydrate, triclofos sodium, opioids etc(8).

Maintenance drug for anesthesia is given to maintain the phase of general anesthesia at stage 3 which is a surgical phase such as amnesia, immobility, and unconsciousness at safe anesthetic depth while also maintaining respiratory and hemodynamic stability(9). There are various drugs available but choosing the right drug at the right dosage can outweigh the risks of general anesthesia.

The purpose of this research was to identify the most often utilized inducing and maintenance medications for children undergoing general anesthesia.

Materials And Methods:

The retrospective investigation was conducted mostly in a private dental college in a hospital setting. Prior to the start of the trial, the Institutional Review Board granted ethical approval. Data was collected from the records of the children less than 17 years of age who were treated for their dental problems under general anesthesia. A total of 73 children who underwent dental treatment under general anesthesia were a part of the research. Data was gathered with following parameters like age, gender, inducing agents and maintaining agents prescribed.

The data was separated into male and female categories and analyzed with SPSS statistical software. The chi square test was used to analyze the data. The level of significance was fixed at 0.05 P value.

Results and Discussion

Results were obtained from the data collected and was analyzed statistically.

Table 1: shows the demographic details such as age and the gender compiled from the data

| | |
|---------------|----------------|
| Age | 3.25 + 1.441 |
| Gender | M-50% F-50% |

Fig 1:

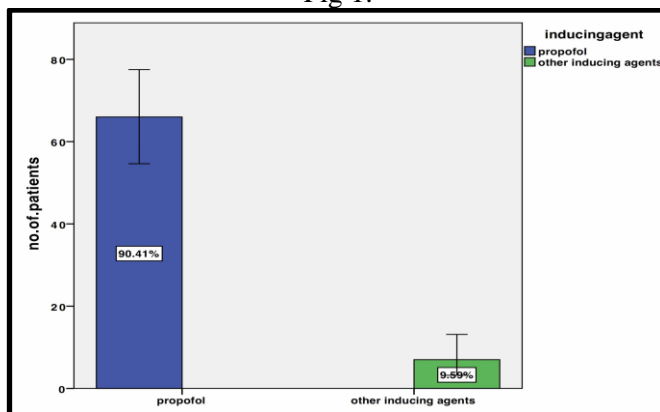


Fig 1: The bar graph represents the percentage distribution of induction agents used.

The above-mentioned bar graph represents the percentage distribution of inducing agents used. From the chart, it is evident that 90.41% of the children are treated with propofol which is found to be the most common agent for inducing general anaesthesia, whereas 9.59% of the children are treated with other agents such as midazolam, ketamine based on the needs of the children.

Fig 2:

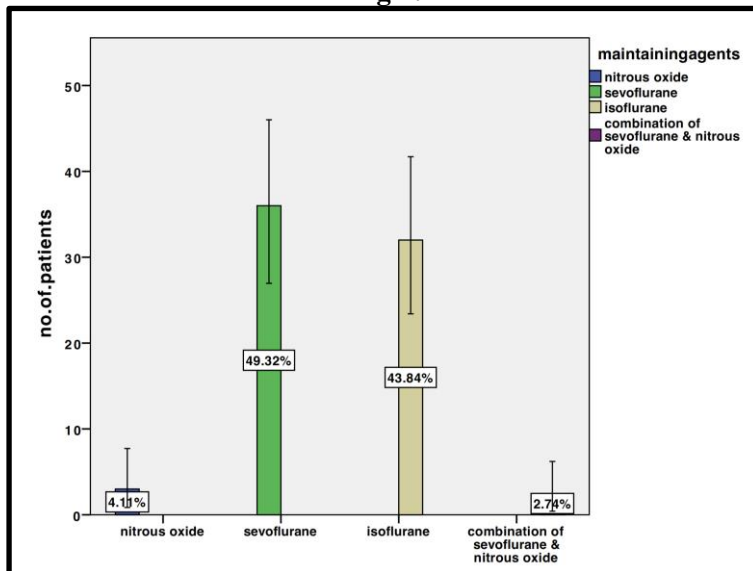


Fig 2: The bar graph represents the percentage distribution of various maintenance agents used .

The above-mentioned bar graph represents the percentage distribution of various maintenance agents used. From the chart it can be seen that, 49.32% of the pediatric population are treated with maintenance agent sevoflurane because of its high tissue and blood solubility, whereas 43.84% of the patients are treated with isoflurane, 4.11% are treated with nitrous oxide and remaining 2.74% are treated with combination of sevoflurane and nitrous oxide.

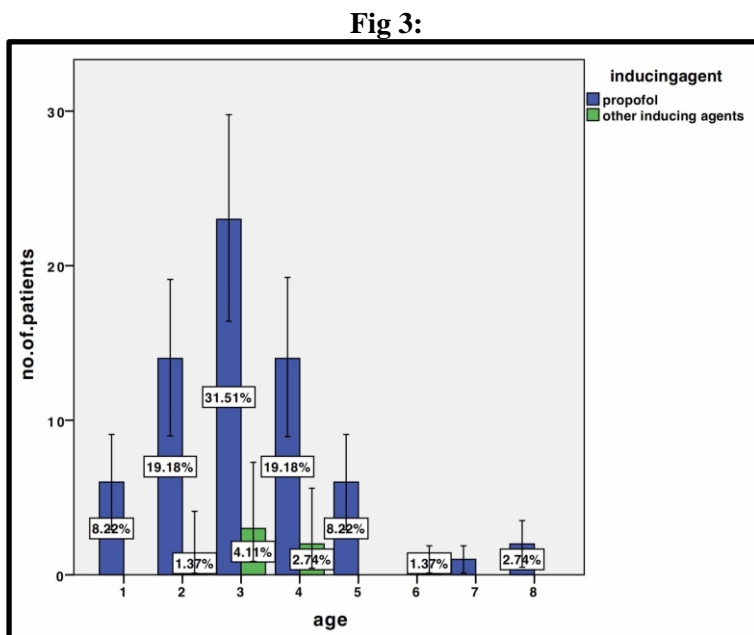


Fig 3: The bar chart represents correlation between age and the various induction agents. X axis represents the age and Y axis represents the percentage distribution of induction agents.

The above-mentioned bar chart represents the correlation between age of the patients and the induction agents used for the general anesthesia. It is evidently seen that for all the age groups from 1-8 years the most commonly used inducing agent is propofol and it is less common to use other induction agents such as ketamine, midazolam. Statistical analysis was carried out with Chi-Square test; p value = 0.121, which was not statistically significant.

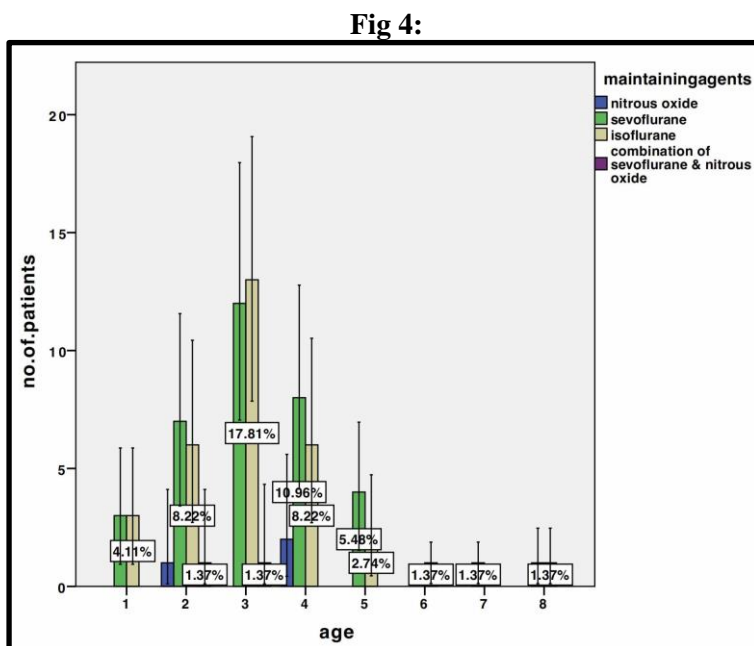


Fig 4: The bar chart represents correlation between age and the various maintaining agents. X axis represents the age and the Y axis represents the percentage distribution of maintaining agents.

The above-mentioned bar chart represents the correlation between age of the patients and the induction agents used for the general anesthesia. It can be seen that usage of maintenance agent is more between the age group of 1-5 years of age in which most commonly used drug is isoflurane and sevoflurane and between

the age of 2-4 years of age nitrous oxide and even combination of maintenance agent is also used. The Chi-Square test was used for statistical analysis; the p value was 0.981, which was not statistically significant

Discussion:

In the present study it was noticed that Propofol is the most commonly used inducing Aesthetic agent used in children(10)(11). The results of the present study is similar to another published article, which also found propofol as the most commonly used induction agent. Propofol which is mostly given through intravenous route and most common drug dose for pediatric patients is 2.9 mg/kg for children under the age of two. It has a quick onset and is linked to less postoperative nausea and vomiting. The study also revealed that propofol is the most commonly utilized anesthetic.(12). An article suggested that among inducing drugs propofol is the most commonly used to induce general anesthesia among pediatric patients which has greater advantage of minimal residual effects on central nervous systems(13). Other inducing agents such as ketamine but not used because of its lowering the breathing rate.

With regards to maintenance drugs, Sevoflurane was the most common drug used followed by Isoflurane. Many previous articles have also stated sevoflurane as the most commonly used drug for maintaining anesthesia as it is a potent inhalation agent that has higher blood and tissue solubilities(14). Major disadvantage associated with sevoflurane is that it is costly and has faster recovery. But the advantage associated is potent, inexpensive, widely available(15). Amongst maintaining drug sevoflurane is used because of pleasant smell, inhalation and easy solubility (16). Another maintenance drug is isoflurane which has better cerebral blood flow and has a major disadvantage of decreasing systemic vascular resistance(17)(18). 4.11% of the subjects were given Nitrous oxide. Nitrous oxide has analgesic and anxiolytic qualities and has a rapid onset, second gas impact. For a faster onset, a mixture of sevoflurane and nitrous oxide can be utilized, which is more favorable. However, this combination maintenance medicine was only administered to a limited number of children (2.74) in the current study.

Conclusion:

Despite the limitations of this investigation, it was obvious that propofol is a regularly utilized inducing drug for pediatric patients due to its quick onset. Amongst maintenance drugs under general anesthesia sevoflurane is used which has greater tissue and blood solubilities for pediatric patients.

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