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Do pediatric patients that receive dexmedetomidine as premedication experience less emergence delirium than pediatric patients that receive midazolam as premedication?

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DO PEDIATRIC PATIENTS THAT RECEIVE DEXMEDETOMIDINE AS PREMEDICATION EXPERIENCE LESS EMERGENCE DELIRIUM THAN PEDIATRIC PATIENTS THAT RECEIVE MIDAZOLAM AS PREMEDICATION?

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Methodology: A systematic review using an electronic database was accessed called PubMed to complete a systematic review. Key words used to search were "midazolam," and "dexmedetomidine," and "pediatric anesthesia" and "emergence delirium" and "premedication.". Inclusion criteria included age of patients between birth and 18 (pediatric populations). All other demographics such as ethnicity, geographic locations, and patient history were included. Inclusion criteria were set that only full-text, scholarly publications were to be included. Inclusion criteria allowed for multiple methodological designs, including but not limited to, literature reviews or systematic reviews. Exclusion criteria were set to publications that covered only general anesthetics. Along with general anesthesia, publications were excluded if they did not compare dexmedetomidine versus midazolam as premedication but treatments for pre-existing conditions. Publications had to include evaluation of emergence delirium in the results. The decision-making process for this literature review was followed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page, et al., 2021). Along with PRISMA, all publications were reviewed with the John Hopkins Evidence-Based practice model to analyze and determine if the data collected throughout each publication had quality, organization, and ability for adaption for practice (Dang, et. al., 2022).

Introduction

Background

Within the profession of anesthesia, there lies a sub-specialty that is referred to as pediatric anesthesia. Pediatric anesthesia, encompassing ages from birth till 18, requires the provider to tailor their approach to age, size, and medical requirements of each individual infant or young child. Along with observing physiological and psychological differences and complications from surgical procedures within the pediatric population, part of customizing the practice of anesthesia is to be aware of the common adverse effects of the anesthetics most used within the practice on said population.

A commonly seen, recognized, treated, and researched adverse effect of anesthesia is emergence delirium (ED) (Lee & Sung, 2020). Emergence delirium, a broad term, determined to be a period of confusion during the recovery of anesthesia and presenting as a variety of symptoms involving, but not limited to, hallucinations, disorientation, restlessness, hyperactive behaviors, and/or anxiety. Emergence delirium can be interchangeable with emergence agitation (EA). Both terms are often diagnosed with the same scales and by the same symptoms (Lee & Sung, 2020). For this review, emergence delirium (ED) and emergence agitation (EA) are both considered the same and are covered under the term emergence delirium (ED).

Emergence delirium has a varied general occurrence of 25% to 80% and can occur at any point in the lifespan from infancy to adulthood (Klabusayova, et. al, 2022). Risk factors for emergence delirium within the pediatric population specifically are ages two through five, no surgical history, an increased number of previous surgeries, attention-deficit hyperactivity disorder, and a multitude of other factors (Lee & Sung, 2020). It is thought that while anesthetics alone may cause emergence delirium within pediatric patients, certain other factors, such as

preoperative anxiety, may also contribute to the occurrence postoperatively. Anxiety within the pediatric population could come from a multitude of different reasons, but include parental separation, fear, and pain (Lee & Sung, 2020).

Combined with the impossibility to control risk factors such as age, medical history, surgical history, or to simply avoid anesthesia for pediatric patients, there is not a current, evidenced based, definitive treatment for the total prevention of emergence delirium (Lethin, et al., 2023). That leaves anesthesia providers with the choice to control what can be controlled and make an honest attempt to prevent emergence delirium. This attempt is usually made by premedicating the patient before the induction of anesthesia. Premedication is administered to alleviate the anxiety, fear, and possibly pain that comes along with induction of anesthesia, administration of anesthesia, and/or surgery together (Dave, 2019).

Midazolam, a benzodiazepine, is the long-standing choice premedication and considered to be the gold standard within the pediatric anesthesia. Premedication dosages range from 0.25-1 mg/kg and are usually given orally, which is considered the easiest route of administration along with the cheapest, but midazolam can be administered intravenously, intramuscularly, or intranasally (Lethin, et. al., 2023). Midazolam provides anxiolytic, amnestic, and sedative properties, which are all considered dose dependent, for patients. These affects lead to mask acceptance during induction, reduced levels of separation anxiety, and decreased incidences of adverse effects postoperatively. Midazolam gives these highly desired affects by working upon gamma-aminobutyric acid (GABA)-A receptors, which are found within the central nervous system. Currently, midazolam is accepted within the pediatric population as a reducer of both the occurrence and severity of emergence delirium with over 80% of anesthesiologists in the United States choosing and preferring midazolam for premedication (Lethin, et al., 2023).

Problem Statement

Midazolam remains the current choice within the practice for premedication in the prevention of emergence delirium, however as research continues there could possibly be a gap between the research and current practice. Throughout the practice of pediatric anesthesia most providers choose to premedicate with midazolam while there may be a more beneficial option of dexmedetomidine.

Literature Review

Efforts to decrease the incidence of emergence delirium can involve a wide variety of choices between both pharmacological and nonpharmacological interventions (David, 2019). The most reputable interventions considered and performed are interventions taken to prevent emergence delirium rather than treatment of existing symptoms of emergence delirium. Currently, the most accepted route of prevention of emergence delirium is premedication with drugs, more specifically premedication with midazolam (Ramlan, et al., 2021).

While midazolam is the choice medication for premedication for multiple reasons, when it comes to emergence delirium, Cox, et. al., (2006) reported midazolam, as a premedication, was inconsistent in preventing emergence delirium after a literature search. Doses of midazolam 0.5 mg/kg orally, administered 20-30 minutes preoperatively were observed within the literature. Results showed that, while proven to reduce preoperative anxiety with both parental/guardian separation and induction of anesthesia, midazolam did not decrease the incidence of all observed cases with only two cases out of eight reporting that there was a decrease, leaving others unaffected with one case increasing the incidence of emergence delirium (Cox, et. al., 2006).

Although commonly recognized within the practice of anesthesia, emergence delirium is not defined by an established set of criteria (Klabusayová, et al., 2022). Instead, emergence

delirium is only diagnosed with tools consisting of questionnaires with multiple criteria questions. As of current, the only one approved is the Pediatric Anesthesia Emergence Delirium (PAED) score. Scoring is based upon five different characteristics: eye contact, purposeful actions, awareness of surroundings, restlessness, and if there is ability to console the child or not. The score is directly correlated with the severity of the emergence delirium with a traditional guideline of greater than ten points being considered emergence delirium. These scorings are purely subjective by the provider that is both observing and documenting them and do not require a certain level of provider (Klabusayová, et al., 2022).

Within the medical community new drugs are always being considered as replacements. A front runner in the trials to replace midazolam from its position of premedication choice within the pediatric population is dexmedetomidine, an alpha-2 agonist (Lethin, et. al., 2023). Dexmedetomidine has been used “off label” for several years within pediatric intensive care units and anesthesia. Dexmedetomidine can be administered orally, intranasally, intramuscularly, caudally, or buccally with current suggested ranges for general administration being 1-4 mcg/kg. While consisting of amnestic, sedative, and anxiolytic effects like midazolam, dexmedetomidine has other properties such as the potentiation of analgesia that midazolam does not have (Lethin, et al., 2023). One of the desired effects of dexmedetomidine is the way it provides sedation, which mimics a natural, sleeplike sedation, while maintaining hemodynamic stability by blocking airway reflexes and attenuating sympathetic responses.

Multiple sources have found that dexmedetomidine is able to both prevent and treat emergence delirium within the pediatric patient population when used as premedication via oral route, intravenous route, or caudal route. Mahmoud & Mason (2015) reported that dosages ranging from 0.5-1 mcg/kg can decrease emergence delirium from 47.7% to 4.8%. It was also

discussed within that publication there are multiple routes of administration of dexmedetomidine that decrease the incidence of emergence delirium. Despite multiple possible and proven methods of administration, there is not yet a set golden standard in which anesthesia providers have accepted for premedication purposes (Mahmoud & Mason, 2015).

Significance

Anesthesia providers of all backgrounds and specialties aim for a well-balanced, evidenced based approach of anesthetics. The approach is one that provides a safe and satisfactory outcome for the patient. Included within safety and satisfactory outcomes is the avoidance of adverse effects of the anesthetic, like emergence delirium. Prevention in the form of premedicating a pediatric patient before induction of anesthesia has been accepted as the standard of care when administering general anesthesia.

When considering the pediatric population, a population which has the highest risk for emergence delirium, there is a demand to find an evidence-based medication that would be considered the most appropriate premedication for the prevention of emergence delirium. While the current practice is to premedicate pediatric patients with midazolam to prevent emergence delirium, research is suggesting that the practice may not be as effective as once thought. Instead, recent research, for example Cox, et. al., (2006), yields data that generate the idea that midazolam does not prevent emergence delirium in a significant way.

Project Purpose

The overall goal of this study was to observe current methods of practice and upcoming methods of practice as well as the outcomes of each. This research study was designed specifically to obtain the results of other publications that involved dexmedetomidine or midazolam administration and the resulting data of incidence of emergence delirium within the

pediatric population with the use of each drug as premedication prior to induction of anesthesia. Within the purpose of this project was to develop an evidence-based recommendation regarding current best practice of dexmedetomidine or the use of midazolam for premedication purposes.

Methodology

Practice Focus Question

This project was intended to answer the following question: Do pediatric patients that receive dexmedetomidine as premedication experience less emergence delirium than pediatric patients that receive midazolam as premedication?

Project Approach

For this project, a qualitative study using a literature review following a systematic approach, an electronic database was accessed called PubMed to complete a systematic review. Key words used to search were “midazolam,” and “dexmedetomidine,” and “pediatric anesthesia” and “emergence delirium” and “premedication.”. Inclusion criteria included age of patients between birth and 18 (pediatric populations). All other demographics such as ethnicity, geographic locations, and patient history were included. Inclusion criteria were set that only full-text, scholarly publications were to be included. Inclusion criteria allowed for multiple methodological designs, including but not limited to, literature reviews or systematic reviews. Exclusion criteria were set to publications that covered only general anesthetics. Along with general anesthesia, publications were excluded if they did not compare dexmedetomidine versus midazolam as premedication but treatments for pre-existing conditions. Publications had to include evaluation of emergence delirium in the results. The decision-making process for this literature review was followed by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Page, et al., 2021). Along with PRISMA, all publications were

reviewed with the John Hopkins Evidence-Based practice model to analyze and determine if the data collected throughout each publication had quality, organization, and ability for adaption for practice (Dang, et. al., 2022). Quality, organization and ability for adaptation were considered of the upmost importance to assure that the project data was reliable. All reviewing, screening, and determinations were concluded personally by the author of this project.

Publications that resulted with the keyword search were screened for titles that involved both midazolam and dexmedetomidine administration, emergence delirium, and involved subjects of the pediatric population. Inclusions criteria was applied. Exclusion criteria was applied. Furthermore, only articles that did comparisons between the two medications and included emergence delirium as a measured outcome were accepted. Diagram 1.1 shows the PRISMA process followed within this research study.

Results

Findings

Klabusayova, et al., (2022) after examining 122 patients determined the incidence of emergence delirium was between 18.1 to 89%. This variance depended on the scoring system used to determine emergence delirium diagnosis (Klabusayova, et al., 2022). The PAED scoring system was used in two separate ways with a cutoff of 10 or a cutoff of 12 points. When the cutoff was 10 points, it was the highest incidence of emergence delirium with 89% of the patients' meeting criteria. With the other scoring system of 12 point cut off with the PAED system it was 19.3% of patients. Other than the PAED scoring system, there were two other scoring systems which included a 18.1% and an 18.9% of patients that met criteria. While a large variance between numbers, the correlation between all three scoring systems sat between 18.1%

and 19.3%, with the outlier being 89% of all pediatric patients included within the study having emergence delirium.

Keles & Kocaturk, (2018) reported a study consisting of 52 pediatric patients between the ages of 3 and 5, had an American Society of Anesthesiologist (ASA) score of 1, underwent general anesthesia, and were premedicated with either 0.5 mg/kg of midazolam or 2 mcg/kg dexmedetomidine orally 45 minutes prior to the induction of anesthesia. For this specific study, the researchers were observing for outcomes of preoperative cooperation and emergence delirium. Researchers used multiple tools to assess preoperative cooperation along with hemodynamic parameters and measured the outcome in question, emergence delirium, by the Pediatric Anesthesia Emergence Delirium Scale (PAEDS). The study revealed overall incidence of 0% within the dexmedetomidine group and 19.2% in the midazolam group (Keles & Kocaturk, 2018).

Prabhu & Mehandale (2017) reported a double-blind study consisting of 90 children consisting of ages 1-10 years old, with ASA physical status of 1 or 2, who underwent general anesthesia. The 90 patients were divided into 2 groups, Group A was administered midazolam 0.5 mg/kg while group B patients were premedicated with 4 mcg/kg, both 45 minutes prior to surgery and then followed exact replica regimens for the remainder of the anesthetic. Among the multiple parameters recorded within the recovery period, PAED scale was used at 0, 5, 15, 30, and 60 minutes postoperatively and scores were recorded. P scores of <0.05 were considered statistically significant while $P < 0.001$ was considered highly significant. Upon arrival, at 5 minutes, and at 15 minutes the P score was <0.001. At 30 minutes the P score was 0.002. At 60 minutes the P score was 0.031. There was a higher incidence of emergence delirium within group A, which had been medicated with the midazolam 0.5 mg/kg. Emergence delirium

incidence was also measured via Aono's 4-point scale in which scores of one and two are not considered emergence delirium and three and four which are considered emergence delirium. In group A, 60% of patients were scored 1 or 2, while 40% of patients were 3 or 4. In group B, 95.5% of patients were scored 1 or 2, while 4.4% of patients were scored 3 or 4 (Prabhu & Mehandale, 2017).

Yao, et. at., (2020) reported a prospective, randomized, double-blind, parallel-group, placebo-controlled trial that involved patients ages from two through six years old, scored one or two on the ASA classification, and underwent general anesthesia for strabismus surgery. Three groups, patients premedicated with 2 mcg/kg intranasally dexmedetomidine, patients premedicated with 0.5mg/kg orally midazolam, or patients premedicated with placebo (normal saline). Outcomes were based on the assessment with the PAED scale in which the same nurse assessed each patient within the study every 5 minutes for 30 minutes postoperatively. Results revealed out of 153 patients enrolled and observed, an 11.5% rate of emergence delirium in the dexmedetomidine group, 44% rate of emergence delirium in the midazolam group, and an 49% rate of emergence delirium in the placebo group (Yao, et al., 2020).

Jannu, et. al., (2016) resulted a randomized controlled trial of 60 children, aged between 1 and 7, who were under general anesthesia. These 60 pediatric patients were divided into 2 groups of 30 and randomly selected to receive 0.75 mg/kg of midazolam orally or 4 mcg/kg of dexmedetomidine orally. Both groups were premedicated 40 minutes prior to surgery and observed during the anesthetic and in recovery. A P score of <0.05 was considered statistically significant. The group receiving dexmedetomidine had lower emergence delirium scores than the midazolam receiving group and a P score of <0.05 (Jannu, et. al., 2016).

Jen, et. al., (2024) consisting of 9 randomized controlled trials that examined premedication with oral midazolam versus oral dexmedetomidine. The 9 trials were covered within the publication but only 5 of the 9 trials contained results of incidence of emergence delirium, consisting of 321 pediatric patients. Evaluation for emergence delirium consisted of the use of postoperative agitation scores, emergence agitation scale, or the PAEDS. Statistical results that 162 patients received dexmedetomidine and 159 received midazolam with results of odds ratio of 0.16; 95% confidence interval: 0.06-0.44; p score <0.001; I^2 = 54%. Since the initial I^2 = 54%, observers created a subgroup with only PAEDS results which the statistical results of odds ratio of 0.13; 95% confidence interval of 0.04-0.36; p score <0.001; and I^2 = 43%. Overall, observers determined that there was, statistically, a lower rate of emergence delirium in patients that received oral dexmedetomidine than those that received oral midazolam (Jen, et. al., 2024).

Saad, et. al., (2020) study compared the differences of intranasal dexmedetomidine versus intranasal midazolam on pediatric patients that underwent an adenotonsillectomy. During a double-blind clinical study that took place in multiple hospitals, 48 children, aged between 3 and 7 with ASA classification scores of 1 were observed. During the anesthetic, patients received the same anesthetics and conditions with the only difference being 24 patients received intranasal dexmedetomidine with a dose of 1 mcg/kg and 24 patients received intranasal midazolam at a dose of 0.2 mg/kg (Saad, et al., 2020). Findings obtained were vital signs before and after the administration of the premedication, documentation of multiple anxiety, mask acceptance, and sedation scales. Results from the study proved to have increased sedation after 30 minutes of administration within the dexmedetomidine group and lower anxiety scores. The study stated that both groups showed decreased postoperative agitation with no statistically significant differences (Saad, et al., 2020).

Discussion

Of the utmost importance to anesthesia providers is protecting patients from adverse events when under their care. Pediatric anesthesia providers, specifically, are looking to prevent emergence delirium. Premedication, an anesthesia providers' first line defense of preventing emergence delirium, is ranked high on the list of importance. When concerning premedication for the pediatric population, dexmedetomidine not only provides the sought after anxiolytic and sedative effects but also produces a decrease in emergence delirium.

Implications

The purpose of this project was to determine the differences on emergence delirium with premedication of midazolam versus the premedication of dexmedetomidine. After reviewing the incidence of emergence delirium being between 25% to 80% within the pediatric population without premedication prior to general anesthesia, an unacceptable rate of incidence, the next step is to decrease the incidence of emergence delirium (Klabusayova, et al., 2022). Based upon the reviewed articles, there was an assured decrease in emergence delirium in premedication with dexmedetomidine and midazolam alone. However, the decrease in emergence delirium is seen greater with premedication with dexmedetomidine than with premedication with midazolam within the data of this project.

The six studies selected within this project showed that on a large scale, even with various doses and routes of administration, dexmedetomidine as a premedication decreases the incidence of emergence delirium. Multiple types of results from statistical analyses, randomized controlled trial results, and various other studies resulted different types of data. While it is difficult or complex to compare data of multiple types and come to an ascertain conclusion, there

was a trend within the data of less incidence of emergence delirium when the patient received dexmedetomidine versus when the patient received midazolam for premedication.

Only one article, Saad, et. al., (2020) showed no significant difference within the results. It should be noted that this study was the only study that compared intranasal administration of both midazolam and dexmedetomidine. Considering it as being an outlier of both the administration category and showing no differences within results, further research may determine that these results were hindered by the different routes of administration or the dosages of which were given through the intranasal routes.

Strengths and Limitations

A strength within the project was the process used to screen for quality of the research obtained by using John's Hopkins Evidenced Based Practice model (Dang, et. al, 2022). Quality research is required for the reader to be able to trust the published data and for the information to be considered when making a change in practice.

Another strength was this study covered a wide variety of research. Throughout the publications of the 6 selected studies, this research study covered 724 patients. The resulting utilized publications provided a large quantity of patients and covered various surgeries with general anesthesia in pediatric patients, an important strength when obtaining attempting to obtain a generalized recommendation such as premedication. When attempting to cover a fair representation of each drug within the pediatric population, a diverse, large quantity of subjects is necessary. This improves accuracy of the true effects of both drugs.

While a variety of patients that were represented within this study is considered a strength, it provides a limitation as well. Without knowing the complete background of each patient, their medical history, or the surgical procedure in which the general anesthesia was

administered for in most cases, it is difficult to predict the different types of pharmacodynamics that were affected within each case alone or possibly the entire study. While these are important pieces to determining evidence-based practices, the overall tone that dexmedetomidine administration is associated with a lower incidence of emergence delirium is a starting point.

A notable limitation was that there were multiple ways to determine emergence delirium. Some providers use different scales to provide a certain standard, however at this current moment there were no standards of prevention or diagnosis. All publications reviewed did not all include the same definition of emergence delirium or same diagnostic tool. Unlike diagnostic results in which there can be a numerical divide for diagnosis, a differential diagnosis allows for bias within the resulting of incidence of emergence delirium. Not only that, but since diagnosis is usually made by the subjective observance of the patient by the record, assumed to be a recovery nurse in most instances, there is room for bias or false or missed diagnosis. One provider may assume the patient is having emergence delirium, while another provider may assume that the patient is acting accordingly to the average, emergence processes in the pediatric population. With multiple studies involved, multiple different providers were making decisions as to the diagnosis of emergence delirium. All things considered, five out of the six publications used within this project did use the PAED scale for at least part of, four which used the PAED scale totally, of the diagnosis which allowed for a minimal amount of bias as possible and provided a type of baseline for each diagnosis.

A notable limitation within the data obtained within this project was the inclusion of different routes of administration and differences within the dosages used in each trial. There are no determined evidenced-based dosages or routes of administration within the anesthetic community for dexmedetomidine for premedication regimens. However, there are multiple

ongoing research efforts to determine the dosage for which works best for pediatric anesthesia (Freriksen, et. al., 2022). Like midazolam, whose dose of 0.5 mg/kg orally is not always effective, there is a chance that dose dependency of both medications makes it harder to compare medication to medication. The limitation side of this is that without a gold standard to follow, it is difficult to scientifically compare the drugs to each other. Due to routes of administration having different absorption rates, metabolisms, and other key pharmacodynamics, there is difficulty to compare the different routes in effectiveness. In Yao, et. at., (2020), midazolam was administered orally while dexmedetomidine was administrated intranasally. This specific study stayed consistent with other publications in results, however one could easily question the differing routes of administration as bias or not accept the results due to that reason.

The lack of gold standard dosing of dexmedetomidine prevents the review of gold standard to gold standard. One drug administered at a higher dose may show more promise, while if the opposing drug was administered at higher dose, it could lead one to believe it had more promise. For example, Saad, et. al., (2020) compared the same routes of administration, intranasally, but midazolam administration was given with the standard dosing. Since there is no standard for the dexmedetomidine, the dose could have been inequivalent to the intranasal dose of midazolam. Until further research is completed, it would be up to individual providers to decide if what is the effective dose of dexmedetomidine or even a comparable dose of dexmedetomidine to the midazolam dose

While bias is typically prevented as much as possible and even though publications were screened and placed into the study by exclusion and inclusion criteria and processes were followed, as mentioned before, there is always a possibility of bias as the screener was an

anesthesia professional. Along with researcher bias, there remains a possibility primary researcher bias within the chosen publications, called publication bias.

Another limitation to this research study was the search strategy for publications and number of publications that were used. Due to the strict inclusion and exclusion criteria, the numbers of publications were limited. The criteria required publications to not only have mentioned but compared both midazolam and dexmedetomidine and used the adverse effect of emergence delirium along with strict criteria on age and type of anesthetic. Along with that, there was only one database used. In the strength side of this, this prevented unpublished and unscholarly articles from being used as publications. It also prevented confusion of premedication versus treatment for emergence delirium. However, it did limit the number, N=6, of publications that could be used within this research study.

A research study such as this one has a daunting task of attempting to compare multiple uncontrollable variables. Patient specific variables such as a large range of ages covered within the population, large differences in cognition, various physical differences within the body, different pharmacodynamics throughout the lifespan, and various childhood medical diagnoses which could be both diagnosed or undiagnosed as a pediatric patient, can change the way in which these medications react on each individual patient. Medication specific variables including but not limited to receptor sites, pharmacodynamics, or dose dependent effects must all be considered in addition to the patient specific variables. The studies included within this project were completed on the wide range of pediatric patients with multiple ethnicities, geographical locations, various pediatric ages, and various surgeries. The variety of obtained data gives assurance that multiple variables were covered throughout this project, possibly without even being known.

What could be seen as a limitation or weakness to the research study, the variables within all the different publications and studies that took place, could be seen as a strength in the fact that despite the multiple different variables, there were alike results. With similar results, with all besides one publication proving a greater decrease in emergence delirium when patients were premedicated with dexmedetomidine versus midazolam, the variables that were all observed pushed towards dexmedetomidine in the argument of dexmedetomidine versus midazolam.

An argument could be made that regardless of the choice, dexmedetomidine is evidenced based to decrease emergence delirium more than midazolam despite routes and dosages of both if readers only were to examine this specific research study. However, this broad statement would not be completely backed up with the evidence presented within this project, as there was one presented study within this project that did not support this argument. Instead, it should be assumed that while there is evidence that supports that patients that receive dexmedetomidine as a premedication experience less emergence delirium than those patients that receive midazolam as a premedication, further studies are required to attempt to find the most appropriate and effective dose and route of administration of dexmedetomidine.

Recommendations

After reviewing the publications included within this project, including taking into considerations the multiple variables, limitations, and strengths of the data, the immediate recommendation would be that dexmedetomidine, as a premedication within the practice of pediatric anesthesia, results in less emergence delirium than midazolam. This research study provided data that proved, at certain doses observed, oral and intranasal routes of administration of various doses of dexmedetomidine are more effective at decreasing the rate of emergence delirium than the current practice of midazolam by either oral or intranasal administration.

While it would be impossible to cover all variables and do a comparison of each drug's reactivity with the variable, there is a definitive recommendation based on evidence provided throughout this research study. Regardless of the multiple variables observed, dexmedetomidine proved greater results at decreasing the incidence of emergence delirium when compared to midazolam.

The dosage and the route of administration would require safe research before instituting dexmedetomidine into evidence-based protocols or standards of care for pediatric anesthesia. Various administrations and various dosages found throughout the literature provided a wide range of acceptable doses that, at the very least, decreased emergence delirium to some extent and kept patients hemodynamically stable and safe. However, further studies could yield more specific information on the most effective dosages and routes of administration of dexmedetomidine in the case of emergence delirium. These sound and proven recommendations should influence providers to make the move towards including dexmedetomidine as premedication to their practice. Collaboration between anesthesia providers and researchers could lead towards changing of evidenced based protocols that, as seen in this research study, could be considered out of date or, at the very least, not as effective treatments as once thought in the anesthesia world.

Looking forward into the future of pediatric anesthesia, dexmedetomidine may take the place of midazolam when administering for the purpose of prevention of emergence delirium. While it would require the previously mentioned proposed studies along with interdisciplinary collaboration and evidenced based driven protocols, there is a possibility this change could be implemented and could bridge the gap from midazolam being the gold standard drug for pediatric populations in the role of preventing emergence delirium to dexmedetomidine being not

only considered but the newer gold standard. While this current research study was not purposed around being able to prove a best dose or protocol, it should be used as a proof of the gap of current practice and proof there is an up-and-coming outlier for the new gold standard for premedication within the pediatric population.

Conclusion

In conclusion, the question of, “Do pediatric patients that receive dexmedetomidine as premedication experience less emergence delirium than pediatric patients that receive Midazolam as premedication?” if answered from the presented evidence within this research study could be determined. When considering the multiple obvious variables and simultaneously finding the best possible method to compare these known variables, this research project data demonstrated a greater decreased incidence for emergence delirium with dexmedetomidine as premedication. This decreased incidence of emergence delirium is in comparison from the incidence of emergence delirium after pediatric patients were given midazolam as premedication. However, as mentioned previously, there are some considerations and recommendations that should be reviewed and further developed based upon the current research that could further support this argument or could prove otherwise.

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FIGURES

Diagram 1.1: PRISMA