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Examining the Development of Perineal Pruritus in Paediatric Patients following Minor Surgical Procedures: A Prospective Cohort Study

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Abstract

Background: *Postoperative nausea and vomiting (PONV) is a common post-surgery complication in adults and children. Dexamethasone, which is widely used for antiemetic and pain control, offers the advantage of minimal long-term side effects, such as hemodynamic instability or adverse effects on the central nervous system, which are typical for other antiemetic drugs. This makes it a preferred choice for perioperative management, providing effective control of nausea and vomiting without compromising patient safety or long-term well-being. Previous studies have noted perineal pruritus, pain, and burning sensations after intravenous Dexamethasone in 25-100% of adults 1,2. Limited data exist on paediatric patients' side effects owing to challenges in expressing sensations. This study aimed to determine whether i.v. Dexamethasone induces perineal pruritus in paediatric patients and shows the distribution of study subjects based on sex.*

Methods: *A prospective cohort study was conducted in the Department of paediatric Surgery, Muratsan University Hospital Complex, Armenia, which included 158 paediatric patients from October 2023 to February 2024, 79 patients undergoing minor surgical procedures received intravenous dexamethasone at an antiemetic dose of 0.2 mg kg-1 diluted in 5 ml 0.9% saline 1 min before general anaesthesia or after induction with inhalation anaesthetic, relevant to their age. After the i.v. injection of dexamethasone, the anaesthesiologist asked the patients for any sensation they had and was assessed by recording answers (yes/no). In cases of little children up to 5 years of age, close monitoring of vital signs was performed to evaluate HR or RR changes during the procedure. The remaining 79 patients did not receive intravenous dexamethasone.*

All recorded observations were analyzed using the exact binomial test, $\chi 2$ test, and G Power Version 3.1.9.7.

Results: *The study included 158 paediatric patients (aged 1-17 years); 50% of patients received the drug, and 15% of patients complained about symptoms of perineal pruritus or burning sensation for 10-30 seconds, which vanished without any further treatment.*

In the case of using i.v. Dexamethasone during induction when patients were already asleep, the main signs of pain were 1.5 times increased in heart rate, frequent breathing in 20-30 duration, and movements of different parts of the body, excluding other options causing pain. The remaining 50% of the patients who had not received the drug did not have perineal symptoms.

Discussion: *The occurrence of Dexamethasone-induced perineal pruritus is a rare complication among paediatric patients compared with adults 2. Until an ideal antiemetic drug is discovered, it is imperative to acknowledge this potential side effects, and actively seek ways to minimise its incidence.*

Conclusion: *This study established a relationship between the administration of intravenous dexamethasone and perineal pruritus in paediatric patients. years (p =0.035), respectively. In this study, no significant association with sex was observed (p-value=0.84). However, this conclusion requires further confirmation using more statistical data.*

Background

Dexamethasone, a synthetic glucocorticoid, has been praised for its potent anti-inflammatory and immunosuppressive effects, pivotal in diverse medical fields since its 1950s synthesis.

Widely used in emergencies, anaesthesia, and intensive care, its approved role is to control post-operative swelling and pain 2,3.

In addition to its established pharmacological effects, the antiemetic properties of dexamethasone have garnered significant interest from pharmacologists and healthcare providers since 1979. Previous research has documented occurrences of itching, pain, and burning sensation in the perineal region following intravenous administration of dexamethasone in adult populations 3.

This observation underscores the importance of further investigation of the potential side effects of dexamethasone, particularly in paediatric patients, to ensure comprehensive understanding and appropriate management in clinical practice.

The occurrence of perineal itching has been observed to fluctuate between 25% and 100% in studies conducted by various authors, with the variance attributed to the dosage of Dexamethasone administered 4,5,6,7,8. The studies included an adult population undergoing minor or major surgical procedures under general anaesthesia.

The neurostructural differences of child organisms, including the low threshold of pain sensation, make them more vulnerable during surgical manipulations; therefore, this research could be an extremely useful tool for minimizing the adverse effects of pain by administering it at the right time of the surgery. The lack of information concerning the side effects of dexamethasone in paediatric patients is primarily attributed to the challenges in accurately discerning and articulating their sensations. Given the increasing prevalence of paediatric surgical procedures and the widespread use of dexamethasone in perioperative care, there is growing interest in understanding the relationship between dexamethasone administration and perineal pruritus in this population. The main goal of paediatric surgery is to contribute to the optimization of perioperative care and mitigation of adverse drug reactions in paediatric populations. A single antiemetic i.v. dose is 0.15-0.2 mg kg-1 to prevent early postoperative nausea and vomiting. Unrecorded data exist regarding the occurrence of perineal pruritus side effects of dexamethasone in paediatric patients, primarily due to challenges in accurately communicating skills, especially in younger individuals who may struggle to effectively express their sensations. This study aimed to investigate the occurrence of perineal pruritus in paediatric patients and examine the relative frequency of the outcome according to sex.

Methods

A prospective cohort study was conducted at the Department of paediatric Surgery, Muratsan University Hospital Complex, Armenia, between October 2023 and February 2024. This study included a cohort of 158 paediatric patients (67 males and 58 females. Patients in need of minor surgical procedures were randomly selected for participation in the study, allowing for a comprehensive evaluation of various factors and outcomes related to paediatric surgery within the specified timeframe.

This study was performed in accordance with the relevant guidelines and regulations, including the Declaration of MOH Armenia for human participants. The experimental protocols were reviewed and approved by Yerevan State Medical University under approval number.

The Armenian Ethics Committee ensured that all aspects of the study, including patient recruitment, data collection, and the use of interventions, adhered to ethical principles. Written informed consent was obtained from all participants (or their legal guardians for pediatric patients) prior to their inclusion in the study. Additionally, confidentiality of patient data was maintained in accordance with institutional and national data protection policies.

Inclusion criteria: The study included patients classified as American Society of Anesthesiologists (ASA) class I who had no previous history of taking steroids or analgesics, and patients who had no prior history of

allergic reactions to steroids.

Exclusion criteria: Patients classified as ASA II, III, or i.v.; those with a history of steroid or analgesic intake; those with a history of drug allergic reactions; those who were recently or at that time were receiving other antiemetics or sedative therapy; or a group of drugs interacting with steroids were excluded from the study.

All ampules of the drug used in the study shared identical manufacturing and storage dates, originated from the same pharmaceutical company, and stored under consistent conditions. Furthermore, peripheral i.v. lines were uniformly employed in all cases, with the exclusion criteria ensuring the absence of catheter-related complications. This standardization protocol aimed to increase internal validity and ensure uniformity in the administration and evaluation of the effects of dexamethasone across the study cohort.
79 patients undergoing minor surgical procedures received intravenous Dexamethasone at an antiemetic dose of 0.2 mg kg-1, diluted in 5 ml of 0.9% saline. The injection duration was approximately 1 min. Depending on the patient's age and persistence of the intravenous line, the drug was administered immediately after induction with inhaled anesthetic sevoflurane, when the patient fell asleep, or 1 min before the intravenous injection of anesthetic propofol, when the patient was awake. This administration protocol aimed to optimize the efficacy of dexamethasone in preventing postoperative nausea and vomiting, while ensuring patient comfort and safety during the surgical procedure.

Patients were not informed of the potential side effects of perineal pruritus. After the intravenous injection of dexamethasone, the anesthesiologist asked patients over 7 years of age for any sensation they had to promptly report any sensations of itching, burning, or pain in the perineal region both during and after the injection. In younger patients, pain scores were evaluated through close monitoring of heart rate and changes in breathing, providing a comprehensive assessment of discomfort levels during the procedure. Those 79 patients(40 male and 39 female) who did not receive dexamethasone did not have pruritus or pain in the perineal area.

Statistical analysis

All observations recorded were subjected to analysis using G Power Version 3.1.9.7 software, and the sample size was calculated using the exact binomial test. The $\chi 2$ test was used to demonstrate the distribution of study subjects according to sex regarding perineal pruritus.

Results

In this study, 158 paediatric patients (84 males and 74 females) underwent minor surgical procedures under general anaesthesia. The first group of 79 patients(44 male and 35 female) received a single dose of intravenous dexamethasone. Notably, the mean age of the participants was found to be 5.67 years among males and 11.29 years among females.

Following the intravenous administration of a single antiemetic dose of dexamethasone, observations revealed that 12 patients (15%) experienced a burning sensation and pruritus. Among this group, four patients ≥7 years of age (33%) reported additional symptoms of burning sensation and itching, while close monitoring revealed pain sensation in eight patients <7 years of age(66%). These symptoms lasted 10-30 seconds disappearing without any intervention.

A p-value of 0.0357 showed that there was a statistically significant relationship between dexamethasone treatment and pruritus among children. This suggests that dexamethasone may cause pruritus in children. Perineal complaints were absent in the second group of 79 patients who did not receive the drug. Statistical analysis did not yield significant findings based on sex regarding perineal pruritus, indicating a p-value of 0.8. Table 1 illustrates the prevalence of perineal pruritus by gender, showing that males are more prone to experiencing pruritus than females.

Table 1

Gender	Perineal pruritus		Total
	Present(n)	Absent(n)	
Male	7	37	44
Female	5	30	35
Total	12	67	79

* A total of 79 patients were included in the study, of whom 7 out of 44 males experienced pruritus, compared to 5 out of 35 females.

Postoperative Nausea and Vomiting (PONV) remains a significant concern in surgical and anesthetic practice, affecting approximately 30% of patients 9,10. Dexamethasone-induced pruritus has been previously explored and discussed in adult practice, and evidence suggests a similar occurrence among children, suggesting that this phenomenon might also affect paediatric patients. This supports the notion that dexamethasone-induced pruritus is not limited to adults, but can also extend to children. Our study claimed that an antiemetic dose of i.v.

Dexamethasone, even in diluted form, can cause perineal pruritus and burning sensation among children during the induction phase of anaesthesia. These sensations are registered from the patients' verbal data and during close monitoring of vital signs, without using any pain score charts. The burning sensation or pruritus lasted 10-30 seconds approximately the same duration as in the previous reported study, and vanished without any treatment. The desired effect of dexamethasone is achieved at an appropriate dosage, as supported by previous studies 11,12,13,14. In adults, a potent antiemetic effect of 8 mg has been reported. In paediatric practice, we have used 0.2 mg per kilo as an antiemetic single dose. Administering Dexamethasone before surgical intervention, particularly during the induction phase of anaesthesia, is crucial for achieving the best outcomes in preventing postoperative nausea and vomiting. We also administered it during the induction phase before surgical intervention 14.

Certain studies have suggested the continued existence of a correlation between pruritus and sex among adult patients; females have a higher incidence of perineal pruritus 14. However, in the paediatric population, we did not find any association with sex.

Postoperative nausea and vomiting are common complications following anaesthesia and pose challenges to postoperative recovery. In addition to being uncomfortable, vomiting can lead to serious complications, such as wound dehiscence, aspiration, dehydration, and increased intracranial pressure. Dexamethasone has emerged as a valuable option for paediatric surgery because of its multifaceted pharmacological properties, affordability, and accessibility. Unlike other antiemetic medications, dexamethasone offers the advantage of minimal long-term side effects, such as hemodynamic instability or adverse effects on the central nervous system. This makes it a preferred choice for perioperative management, providing effective control of nausea and vomiting without compromising patient safety or long-term well-being. With intravenous administration, dexamethasone exhibits a rapid onset of action and a prolonged duration, making it indispensable for optimal perioperative management.

The cause of dexamethasone-induced pruritus remains unknown and necessitates further research.

Strengths and limitations

In our study, we utilised a single dose of 0.2 mg kg-1, a practice distinct from adult anaesthesia where undiluted 8 mg of dexamethasone is commonly employed. Specifically, in our study, we administered an antiemetic dose of 0.2 mg kg-1 diluted with 5 ml 0.9% saline, representing a lower dosage regimen. This approach ensures effective antiemetic action, while minimizing the potential adverse effects associated with higher doses. However, we may need to choose a more diluted option with 10 ml saline to prevent pruritus, which is one of

the limitations.

In adult cases, patients are typically informed in advance about potential side effects, which complicates the interpretation of the study results. However, in our study, the patients were not pre-informed and were simply asked to report their feelings, thereby simplifying symptom detection. Detecting symptoms in paediatric patients, particularly after induction with inhaled anesthetics, can be challenging. Therefore, we closely monitored vital signs in such cases.

To ensure a more precise and robust statistical analysis of the correlation between symptoms of perineal itching and sex, it is advisable to incorporate a larger sample size.

Conclusions

Dexamethasone-induced perineal pruritus also occurs in children undergoing minor surgical intervention. The study does not provide crucial evidence to assert that females are more susceptible to perineal pruritus than males. However, it is crucial to familiarise themselves with these symptoms and implement the necessary precautions to prevent or minimise the discomfort experienced by patients.

Data Availability

The data that support the findings of this study are not openly available due to reasons of sensitivity and are available from the corresponding author upon reasonable request.

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