



Comparison of the Effect of Dexamethasone and Ondansetron in the Prevention of Nausea, Vomiting and Delirium in Children Under Endoscopy Under Anesthesia

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Keywords: UGIE (Upper GI Endoscopy); Dexamethasone; Ondansetron; PONV; Delirium; PAED.

Abstract

Introduction: Gastrointestinal endoscopy is one of the most important diagnostic and therapeutic methods that is being performed in children day by day. Nausea vomiting, delirium, bronchospasm, and laryngospasm after anesthesia are the most common complications after endoscopy in children. These complications may cause anxiety and fear to both the patient and their companions. Due to the lack of adequate studies in this field on how to prevent these complications, this study compares the effect of injectable dexamethasone and injectable ondansetron in controlling nausea, vomiting and delirium after endoscopy in children.

Materials and methods: In this clinical trial study, 60 children aged 5 to 14 years who were candidates for Upper GI Endoscopy (UGIE) referred to Shahid Beheshti Hospital in Kashan and Imam Hossein Hospital in Isfahan were studied in three groups receiving dexamethasone, ondansetron, and control group.

The procedure was as follows: Before UGIE, when the anesthesia level was sufficient, children in the dexamethasone and ondansetron groups received 0.1 and 0.15 mg / kg intravenously, of each respective agent, and the control group did not receive any medication.

Deep anesthesia with midazolam at a dose of 0.05 mg / kg was performed as a premedication and then propofol at a dose of 1-2 mg / kg for induction and then 50-75 µg / kg as an infusion was provided under the supervision of an anesthesiologist.

After UGIE, the recovery status, delirium score, and nausea-vomiting frequency of children were evaluated. The collected data were analyzed by SPSS software version 26 using Chi-square tests and analysis of variance.

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Result: In the control group, 65% of children had nausea, but none of the children in the other two groups had this complication, which was a significant difference ($p < 0.001$). Also in the control group, 15% of children suffered from vomiting, which was not observed in either of the other two groups, although this difference was not significant ($p = 0.1$). Also, the mean score of delirium in the ondansetron group was significantly higher than the other two groups ($p < 0.05$).

Conclusion: The combination of dexamethasone, propofol and midazolam in pediatric endoscopy, in addition to reducing nausea and vomiting after endoscopy, results in a lower delirium score and a higher recovery score, and its use is preferable to ondansetron due to its reasonable price.

Introduction

The use of Upper GI Endoscopy (UGIE) for diagnosis and treatment in children is expanding day-by-day [1]. It is possible to do the procedure without anesthesia or with mild anesthesia [2]. However, the use of anesthesia in children makes the patient more comfortable, with better cooperation between the patient and parents and the doctor and increases the procedure's efficiency [2,4]. One of the important factors in choosing the type of anesthesia drug used in children is the rate of complications [5,6].

One of the most common complications of anesthesia in children is postoperative nausea and vomiting [3]. Its incidence is 2 times higher than adults [7,8]. This complication can lead to delays in patient discharge, slows recovery, and ultimately increases treatment costs [9].

Another complication that is more common with anesthesia is delirium. [10,11]. Numerous medications are used to prevent nausea, vomiting, and delirium after procedures.

Propofol is an injectable anesthetic and GABA receptor agonist used for sedation before procedures [12]. It is relatively safe and inexpensive and is widely used in many endoscopic centers [13]; Midazolam is a benzodiazepine drug used for sedation in endoscopy [16]. Dexamethasone was first reported as an antiemetic in patients undergoing chemotherapy [17,18]. Studies have shown that dexamethasone exerts its effects through the central nervous system. Recently, its effectiveness in reducing post-operative nausea and vomiting in several procedures for children and adults and also reducing delirium have been reported in a few studies [9,19]. Ondansetron is an anti-nausea and vomiting drug that was first used to prevent nausea and vomiting caused by chemotherapy. This drug does not have many side effects but is not commonly used in pediatric procedures. It is also less effective than other antiemetics, including promethazine. Although recent studies have been performed on the effect of this drug in reducing nausea and vomiting after endoscopy and recovery time, there is insufficient evidence about the possible effect of this drug on other postoperative complications such as delirium and hallucination [29].

Considering the above and that the complications of anesthesia after endoscopy have been well studied, the aim of this study was to compare the effect of prescribing a dose of injectable dexamethasone to injectable ondansetron administered before upper endoscopy in reducing the rate of PONV and de-

lirium (Post - Anesthesia Emergency Delirium or = PAED) in children referred to the endoscopy department of Shahid Beheshti Hospital in Kashan and Imam Hossein Children's Hospital in Isfahan in 2020-2021.

Materials and methods

This study, which is a clinical trial, was performed on children aged 5-14 years who were candidates for elective UGIE with deep anesthesia referred to Shahid Beheshti Hospital in Kashan and Imam Hossein Hospital in Isfahan in 2020-2021, after receiving written informed consent from their parents. All children were candidates for endoscopy with sedation according to the opinion of the pediatric gastroenterologist.

Inclusion criteria: Patients who are not ERCP candidates, ASA class I or II, simplified APFEL score 1 (Only age ≥ 3).

Exclusion criteria

Receiving more doses of anesthetic due to prolonged procedure, history of allergy to the drugs used in the study, history of previous chemotherapy, malignancy, metabolic disease, diabetes, anatomical disorders of the UGIE, behavioral disorders, or patients undergoing psychiatric medication, as well as children who have not received sedation prior to the procedure.

Patients are randomly divided between the dexamethasone and ondansetron groups and the control group in a 1: 1 ratio.

In order to generate a sequence of random numbers, computer software was used and then the patients were divided into three groups by block randomization (Block of 6)

All endoscopies were performed by a pediatric gastroenterologist under the supervision of an anesthesiologist. All patients underwent a pre-determined and completely identical procedure.

Patients were not allowed to eat solid foods for 6 to 8 hours before the procedure, but could drink clear liquids up to 2 hours before. For all patients, an intravenous line was placed and standard monitoring and recording of vital signs were performed. During the procedure, patients were continuously monitored for heart rate, blood pressure, respiration rate and oxygen saturation.

In order to maintain anesthesia, an endoscopic oral airway was used at the same time as the endoscopy, which has an endoscope passage and does not leak. Children underwent deep anesthesia with midazolam at a dose of 0.05 mg / kg as a pre-medication and then propofol at a dose of 1-2 mg / kg for induction and then 50-75 micrograms per kg per minute by infusion under the supervision of an anesthesiologist.

5 minutes before endoscopy, IV dexamethasone 0.1 mg / kg was injected into the dexamethasone group and 0.15 mg / kg IV ondansetron was injected into the candidate group receiving ondansetron, and the control group did not receive any medication.

After the procedure, patients were transferred to the recovery ward and evaluated for PAED scores and nausea-vomiting frequency and recovery scores (Modified Aldrete: MA) 15 minutes after entering the room.

This study was registered in the Iranian Clinical Trial Registration Center (IRCT) with the code: IRCT20200809048343N1.

Result

In this study, 60 children in three groups of 20 people receiving dexamethasone, ondansetron and control were studied.

- The data in the table are reported as frequency (percentage) / standard deviation \pm average.

The results of Table 1 show that the studied groups have no significant relationship with the variables of sex, age, weight and endoscopic cause ($p > 0.05$); In other words, the studied groups are matched in terms of the mentioned variables and do not act as confounding variables.

The result of Table 2 show that at the end of endoscopy there was no significant difference in terms of mean clinical findings (SBP, DBP, HR) between 3 groups ($P > 0.05$)

Also, the minimum recovery score in ondansetron group was significantly lower than the other two groups ($p < 0.05$).

In addition, the mean score of delirium in the ondansetron group was significantly higher than the other two groups ($p < 0.05$).

The results of Table 3 show that in the control group, 65% of children had nausea, but in none of the children in the other two groups, this complication was not observed, which was a significant difference ($p < 0.001$).

Table 1: Descriptive characteristics of children in three groups.

Groups Variable		Dexamethasone	Ondansetron	Control	p-value
Gender	Boy	7 (35)	10 (50)	7 (35)	0/535
	Girl	13 (65)	10 (50)	13 (65)	
Age		9 \pm 2.9	9.4 \pm 3.25	10.4 \pm 3.45	0/371
Weight		30.22 \pm 11.85	28.75 \pm 10.78	26.93 \pm 8.67	0/679
Cause of endoscopy	Abdominal Pain	18 (90)	15 (75)	19 (95)	0/192
	Reflux Other	1 (5)	0	0	
	(Foreign body ingestion, ...)	1 (5)	5 (25)	1 (5)	

Table 2: Comparison of clinical findings, recovery status and delirium between the three groups.

Groups Variable		Dexamethasone	Ondansetron	Control	p-value
SBP	5 min after starting	106.58 \pm 12.41	101.80 \pm 12.01	95.75 \pm 11.39	0/023
		107.79 \pm 17.13	97.05 \pm 13.36	102.05 \pm 11.68	0/070
		101.75 \pm 10.88	97.05 \pm 10.52	99.50 \pm 10.98	0/415
DBP	Before drug inj	67.10 \pm 13.64	61.55 \pm 13.84	67.00 \pm 8.33	0/268
	5min after starting	61.68 \pm 11.73	53.10 \pm 9.31	66.75 \pm 8.78	0/000
	End of endoscopy	60.85 \pm 11.80	57.10 \pm 19.03	65.79 \pm 8.21	0/158
HR	Before drug inj	106.50 \pm 16.36	105.75 \pm 13.93	104.00 \pm 15.17	0/867
	5min after starting	108.00 \pm 20.39	111.00 \pm 17.70	102.10 \pm 16.46	0/308
	End of endoscopy	102.20 \pm 16.37	109.22 \pm 15.96	101.84 \pm 13.24	0/262
MA Score		9.20 \pm 1.00	8.45 \pm 1.19	9.80 \pm 0.41	0/000
PAED Score		5.25 \pm 1.41	6.55 \pm 1.85	4.60 \pm 1.09	0/001

Table 3: Comparison of side effects of anesthetic drugs between the three groups.

GrSide effect	Dexamethasone	Ondansetron	Control	p-value
Apnea	0	2 (10)	0	0/322
Nausea	0	0	13 (65)	0/000
Vomiting	0	0	3 (15)	0/100
Bradycardia	0	0	0	-
Bronchospasm/Laryngospasm	0	0	0	-
Hallucination	0	0	0	-

Discussion

In this study, the effect of injectable dexamethasone and ondansetron on nausea-vomiting, delirium and recovery score in children undergoing UGIE referred to the endoscopy unit of Dr. Beheshti Hospital in Kashan and Imam Hossein Children's Hospital in Isfahan in 1399 has been investigated.

The findings of the present study showed that 15 minutes after entering recovery in the control group (without medication), 65% of children had nausea, which was not observed in either of the other two groups. Based on this goal, the results of a similar study by Moheimani et al. Showed that in the dexamethasone group, the percentage of people who suffered from nausea and vomiting after endoscopy was lower than the placebo group (8.2 vs. 26.5%) [22]. It is noteworthy that in this study, nausea and vomiting in the form of an item (PONV) was investigated. Also, the anesthetic drugs used in the study were sodium thiopental and sevoflurane, which can lead to nausea and vomiting in the placebo group [22] but in the present study, propofol and midazolam were used. In addition, in the study of Farahmand et al., It was shown that in the ondansetron group, the percentage of people who suffered from nausea-vomiting after endoscopy was lower than the placebo group (3 vs. 17%) [29] but in the present study, there was no nausea and vomiting in the ondansetron group. In another study by Shafa et al., The severity of nausea and vomiting in the group receiving the combination of dexamethasone and ondansetron was lower than the placebo group [30], which in the present study did not examine the combination of the two drugs.

The present study showed that 15 minutes after entering the recovery, the delirium score in the ondansetron group (6.55 ± 1.85) was higher than the dexamethasone group (5.25 ± 1.41) and the control group (4.60 ± 1.09). In a study by Moheimani et al., The delirium score in the dexamethasone group was not significantly different from the placebo group (5.9 vs. 5.7) (22). Which is consistent with our study. Also, in the Farahmand study in the ondansetron group, the delirium score was not significantly different from the control group score (18.4 vs. 18.1) (29), which was not consistent with our study. Another study by Khalili et al. In children undergoing Adenotonsillectomy showed that administration of dexamethasone 30 minutes before anesthesia could be effective in reducing delirium and emergent agitation [28]. The present study showed that the use of dexamethasone showed a lower mean score of delirium than the ondansetron group. It should be noted that Delirium scoring system after anesthesia is a kind of scoring system based on clinical judgment in which scoring is completely dependent on the individual. And can lead to differences in delirium scores in our study with other studies. The number of studies that have been done before this study and with a similar subject is very limited and in most cases have been procedures other than endoscopy, which can also lead to differences in the results of the present study with previous studies. Also, some patients develop delirium symptoms after discharge from recovery and at home, which were not recorded in this study. In addition, the patients' recovery score according to the MA scoring system, 15 minutes after entering the recovery room in the dexamethasone group (9.2 ± 1) was higher than the ondansetron group (8.45 ± 1.19) while compared to the control group (9.8 ± 0.41) Was not significantly different. In the study of Moheimani et al., The mean MA score five minutes after entering recovery in the dexamethasone group was not significantly different from the control group (9.5 vs. 9.4) [22] which is consistent with

this study. Also, in Farahmand study, MA recovery score in ondansetron group was higher than placebo group (9.4 ± 0.06 vs. 9.2 ± 0.08) [29], it should be noted that in this study, the time of MA scoring in Farahmand study was not specified, which could be one of the reasons for the increase in recovery score compared to our study.

Conclusion

According to this study, it can be concluded that the combination of dexamethasone, propofol and midazolam, in addition to reducing nausea-vomiting after endoscopy, produces a lower delirium score and a higher recovery score, and its use is preferable to ondansetron due to its reasonable price.

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