Orginal Article
Eurasian Journal of Critical Care

Effect of Using Metoclopramide and Ondansetron in the Emergency Department on the Treatment Duration

Oya Güven[1]*, Özlem Tataroğlu[2], Dilay Satılmış[3], Mehmet Özgür Erdoğan[4]
[1]Kırklareli University School of Medicine, Kırklareli Training and Research Hospital Department of Emergency Medicine, Kırklareli, TURKEY
[2]University of Health Sciences Dr. Lütfi Kırdar City Hospital, Department of Emergency Medicine, Istanbul, TURKEY,
[3]University of Health Sciences Sultan 2 Abdülhamid Han Training and Research Hospital, Department of Emergency Medicine, Istanbul, TURKEY
[4]Bahcesehir University School of Medicine, Department of Emergency Medicine, Istanbul, TURKEY

Abstract

Objective: The complaint of nausea and vomiting can be a symptom or result of many diseases. It may impair the comfort and even the general condition of the patient. Therefore, patients admitted to the emergency room expect to correct these complaints as quickly as possible. The most commonly used drugs for this are metoclopramide and ondansetron.

Materials and Methods: In our study; a one-month period, 99 patients who presented to our emergency department with complaints of nausea, vomiting, and diarrhea due to any disease were included (excluding trauma and cancer patients). It was noted how quickly the symptoms decreased when metoclopramide 10 mg or ondansetron 8 mg were administered intravenously.

Results and Conclusion: After antiemetic application in the emergency room; We observed that the complaints disappeared more rapidly in patients treated with ondansetron than in patients treated with metoclopramide (mean 16/ minute, p<0,005).

Key Words: Nausea, Metoclopramide, Ondansetron, Emergency Service

Introduction

Nausea and vomiting can be symptoms as well as consequences of many diseases. It is an important indicator regarding the prognosis of the disease. For example, if it is seen after a head injury, it is accepted as an indicator of serious conditions such as bleeding and fracture. Although vomiting is most common in gastrointestinal system diseases, if it progresses to disrupt oral nutrition, it may cause dehydration and kidney failure, and even aspiration pneumonia in elderly and post-op patients.

Stimuli giving rise to nausea and vomiting originate from visceral, vestibular, and chemoreceptor trigger zone inputs which are mediated by histamine/acetylcholine and serotonin/dopamine, respectively. These relationships serve as the basis on which current pharmacological therapy for nausea and vomiting is recommended[1,2]. Therefore anticholinergics, antihistamines, phenothiazines, corticosteroids, butyrophenones, 5-HT3 antagonists, cannabinoids, benzodiazepines, NK-1 receptor antagonists and benzamides may be used for the treatment of nausea and vomiting.

In this article; In antiemetics, we use it frequently; We will try to examine the effect of intravenous administration of metoclopramide (from benzamides) and ondansetron (one of the 5-HT3 antagonists) on the duration of stay in the emergency room.

Materials and Methods

In our study, male and female patients over age 18 who were admitted to our emergency service with nausea and diarrhea within one month were included. Trauma and cancer patients were not included in the study. It was accepted that they gave 10 points for nausea at the time of application to the patients and they were asked to inform us when they could give 0 points after drug administration. Thus, we observed that her/his complaints were completely resolved. 10 mg metoclopramide or 4 mg ondansetron slowly intravenous (IV) medication to the patients, what drug was administered by the single-blind method without being told. Demographic characteristics, decrease in nausea after few minutes after drug administration, and development side effects were noted. Patients who need received repeated medication were excluded from the study. The distribution of variables was measured with the Kolmogorov Simirnov test. Mann-Whitney U test was used to analyze quantitative independent data. Chi-square test was used in the analysis of

Corresponding Author: Oya Güven **e-mail:** ersinoya@yahoo.com
Received: 25.02.2021 • **Accepted:** 28.08.2021
Orcid: https://orcid.org/0000-0002-6389-4561

Oya Güven **e-mail:** ersinoya@yahoo.com
Özlem Tataroğlu **e-mail:** dr_glabella@hotmail.com
Dilay Satılmış **e-mail:** drdilay09@gmail.com
Mehmet Özgür Erdoğan **e-mail:** ozgurtheerdogan@mynet.com

qualitative independent data. SPSS 27.0 program was used in the analyzes. p <0.05 was considered significant.

Results

99 patients were included in our study. 56 (56.6%) of them were women and 43 (43.4%) were men. The average age of the patients was 34. Patients; Those with only nausea complaints or diarrhea and nausea were divided into 2 groups. All patients had nausea, 78 (78.8%) patients had diarrhea and nausea. 51 (51.5%) patients were administered ondansetron, 48 (48.5%) patients were administered metoclopramide slowly IV. Ondansetron was given to 40 patients with diarrhea and nausea and 51 patients with only nausea. There was no significant difference between the 2 groups in terms of the duration of their symptoms (p>0.005).

The complaints of the patients who were given ondansetron decreased in an average of 16 (15.9±2.1) minutes, while those of the patients who were given metoclopramide decreased in an average of 48 (47.5±9) minutes. Therefore, the average duration of observation was significantly longer for patients receiving metoclopramide than for those receiving ondansetron (p<0,005) (Table-1).

No side effects were observed with either drug application.

Discussion

The underlying mechanisms involved in nausea are complex and encompass psychological states, the central nervous system, autonomic nervous system, gastric motility, and the endocrine system. To understand the pathophysiology underlying nausea, it is important to introduce the concept of the dynamic threshold. It is thinking that each individual has a threshold for nausea that changes minute by minute. At any given moment, the threshold depends on the interaction of certain inherent factors of the individual with the more changeable psychological states of anxiety, anticipation, expectation, and adaptation. This dynamic interaction likely explains the inter-and intra-individual variability that is typically encountered in the face of a nauseogenic stimulus[3].

Metoclopramide (4-amino-5-chloro-2-methoxy-N- (2 dimethylamino methyl benzamide) from the benzamides class is an old antiemetic agent that has been used widely in emergency services for nausea and vomiting as well as other gastrointestinal disorders. It is an antidopaminergic agent, centrally and peripherally acting, in order to enhance upper gastrointestinal motility without affecting its secretion. It is metabolized by the hepatic Cytochrome P450-CYP2D6 enzyme. Routes of administration include oral, intramuscular (IM), and intravenous (IV)[4,5]. The most common side effects; restlessness, drowsiness, fatigue and weakness. Rarely, insomnia, headache, oculogyric crisis, bowel disorders, paralysis of the speech and masticatory muscles or tetanus-like dystonic reactions, and extrapyramidal reactions such as akathisia may occur. Such reactions are temporary and disappear within 24 hours after drug withdrawal. In a study conducted on patients with head trauma; Metoclopramide was administered to 93 patients. Headache was the most common reported side effect (46.2%), followed by anxiety and drowsiness with (39.7%) and (27.9%); respectively. Fatigue reported in (24.7%). While dystonia was the least common and developed only in 5.3%. It was stated that another drug may be preferred instead of metoclopramide, as similar findings will be seen in the follow-up of patients with head trauma[6].

Serotonin 5-HT3 antagonists such as granisetron and ondansetron have utility in post-operative vomiting, post-radiation therapy, and in preventing chemotherapy-related emesis[7]. Their mechanism of action is mediated primarily through central 5-HT3 receptor blockade (mainly in the chemoreceptor trigger zone) and peripheral blockade of 5-HT3 receptors on intestinal vagal and spinal afferent nerves[8]. Routes of administration include oral, IM and IV. IV form is most commonly used in emergency medicine. The most commonly reported side effects (occurring in more than 10% of adults) include a headache, fatigue, dry mouth, malaise, and constipation. Some fewer common effects range

Table-1: Demographic characteristics of patients, complaints and effect of drugs

	Metoclopramide	Median	Ondansetron	Median	p
	Mean±SD/% n		Mean±SD/% n		
Age	38.8±17.6	32	40.3±19.9	38	0.889[m]
Gender F M	27 (56.3%) 21 (43.7%)		29 (56.9%) 22 (43.1%)		0.951[x2]
Complaint recovery time	47.5±9	48	15.9±2.1	16	**0.000[m]**
Diarrhea (+) (-)	38 (79.2%) 10 (20.8%)		40 (78.4%) 11 (21.6%)		0.929[x2]
Nausea	48 (97.9%)		51 (100%)		1.000[x2]

SD: Standard Deviation, F: Female, M: Male, m: Mann-Whitney U test, x^2: Chi-Square test

from central nervous system (CNS) manifestations, such as drowsiness and sedation to local injection site reactions and pruritus. A transient increase in liver function tests has been reported as well. Although typically clinically insignificant, ECG interval changes such as QTc elongation can be seen. These changes typically take place within 1 to 2 hours after administration with a return to baseline within 24 hours. As with any medication that causes QTc elongation, there is a concern for Torsade de Pointes and other arrhythmias. However, this drug-related effect can be seen when administered at a dose of 16 mg or more[9]. Since we administered 8 mg to our patients, we did not observe this side effect. There is no known antidote to ondansetron, and supportive measures are used for overdose. In this respect, it is safe as long as side effects are followed.

In a study conducted; Metoclopramide, ondansetron and placebo were administered preoperatively to patients undergoing cholecystectomy. Nausea complaints were observed for 24 hours after surgery. The incidence of vomiting was 8% for metoclopramide, 4% for ondansetron, and 22% for placebo in the post-anesthesia care unit or day surgery[10].

In another study conducted with pregnant women diagnosed with hyperemesis gravidarum; Patients who were administered ondansetron stated that their nausea disappeared more rapidly within 24 hours compared to patients who were administered metoclopramide. Thus, the duration of hospitalization has decreased[11].

In our study, the nausea complaints of the patients who were applied ondansetron were faster than the other group and the duration of hospital stay was shorter. This situation can be discussed for the time that our patients' nausea complaint completely passed.

In our country, the use of metoclopramide in emergency services is quite common. This may be due to the lack of a habit of using ondansetron. Ondansetron, which started to be used in our country in the 90's; It was primarily used in patients receiving cancer treatment. It was later that the emergency physician met ondansetron. Therefore, the emergency physician; During her/his education, she/he continued use whatever treatment she/he received, as well as her/his order. Another reason is; Metoclopramide may be used more because it is less expensive.

Study Limitations

There are some limitations in our study. The number of patients was also fewer, as the patients who were admitted to our emergency department in a short period of 1 month were included. In addition, since we did not administer additional doses of medication to patients whose nausea did not completiy, we could not observe possible side effects that may develop as a result of high doses of medication (Because patients whose nausea did not recover were excluded from the study). Therefore, it is difficult to say that both drugs are innocent.

Conclusion

In emergency services; Although the price is high, we hope the use of ondansetron with a shorter duration will become widespread. Perhaps the fee and frequency of use can be regulated.

References

1. Chepyala P, Olden K. Nausea and vomiting. Curr Treat Options Gastroenterol. 2008; 11: 135–144.
2. Singh P, Sonia SY, Braden Kuo. Nausea: a review of pathophysiology and therapeutics. Therapeutic advances in gastroenterology. 2016; 9(1): 98-112.
3. Stern R. The psychophysiology of nausea. Acta Biol Hung. 2002; 53: 589–599
4. Moezzi M, Delirrooyfard A, Motamed H, Mortazavi MK. Antiemetic effects of metoclopramide with and without dexamethasone in children with minor head trauma: a single blind randomized clinical trial. Specialist EM. 2018; 188:7307–13.
5. Zamani M, Namdar B, Azizkhani R, Ahmadi O, Esmailian M. Comparing the antiemetic effects of ondansetron and metoclopramide in patients with minor head trauma. Emergency. 2015; *3*(4): 137.
6. Al Jaadi S, Al Kindi Y, Al-Saadi T. Safety of metoclopramide in traumatic brain injury patients: A systematic review of literature. Romanian Neurosurgery. 2020; 512-517.
7. Hasler W, Chey W. Nausea and vomiting. Gastroenterology. 2003; 125: 1860–1867
8. Hornby P. Central neurocircuitry associated with emesis. Am J Med. 2001; 111:106S–112S.
9. Griddine A, Bush J. S. Ondansetron. StatPearls [Internet]. 2020.
10. Wilson EB, Bass CS, Abrameit W, Roberson R, Smith RW. Metoclopramide versus ondansetron in prophylaxis of nausea and vomiting for laparoscopic cholecystectomy. The American journal of surgery. 2001; 181(2): 138-141.
11. Abas MN, Tan PC, Azmi N, Omar SZ. Ondansetron compared with metoclopramide for hyperemesis gravidarum: a randomized controlled trial. Obstetrics & Gynecology. 2014; 123(6): 1272-1279.