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Systematic review

Effectiveness of Ondansetron and Metoclopramide in Management of Post-Operative Nausea and Vomiting in Laparoscopic Surgeries

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ABSTRACT

Post-operative nausea and vomiting (PONV) is one of the most complicated and serious problems with anesthesia and surgical practices that may occur separately or in combination, and without prophylactic intervention. It is account for one third of patients under general anesthesia. This study aims to compare the efficacy of Ondansetron and Metoclopramide on post-operative nausea and vomiting in laparoscopic surgery. Data of four studies were integrated with a total number of 979 patients. Then, PONV in accordance to Ondansetron and Metoclopramide was analyzed and calculated. The results show that the incidence of PONV in metoclopramide patient's group was (423/979) 43% and in ondansetron patient's group was (404/979) 41%. There was no clear difference between the two groups. However, Ondansetron was slightly effective than metoclopramide in reducing PONV.

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INTRODUCTION

The most frequent reason for nausea and vomiting after surgery is anesthesia. Postoperative nausea and vomiting (PONV) is a condition that affects about 30% of people who undergo surgery [1]. Besides, patients' gender, a history of motion sickness, non-smoking, patients under 50 years old, patients with abdominal disease, hypothyroidism, pregnancy and elevated intracranial pressure (ICP) may all affect PONV [2]. Several pharmacological agents have been indicated for the prevention and treatment of PONV, including dopamine receptor antagonists, histamine antagonists, anticholinergics, serotonin antagonists, and dexamethasone [3].

Metoclopramide (dopamine antagonist) and Ondansetron (serotonin receptor antagonist) are two popular antiemetics commonly used to manage PONV. Metoclopramide is a potent dopamine D2 receptor antagonist and blocks H1 and 5-HT3 receptors as well as D2 receptors. This drug also blocks D2 receptors in the gastrointestinal tract and enhances 5-HT4 receptors, improving prokinetic properties to induce antiemetic effects [4]. Ondansetron is one of a selective 5-HT3 serotonin-receptor antagonist used for its antiemetic properties. 5-HT3 antagonists act by preventing serotonin binding to 5-HT3 receptors, which present on the vagus afferent nerve endings, which send signals directly to the vomiting center in the medulla oblongata and in the chemoreceptor trigger zone (CTZ) of the brain. By preventing activation of these receptors, 5-HT3 antagonists interrupt one of the pathways leading to vomiting [3].

PONV is still one of the most common causes of patient displeasure and discomfort. Furthermore, PONV can result in unanticipated hospital stay, a delay in post anesthesia care unit discharge and raising medical expenses. The goal of this

study is to clarify the efficacy of Ondansetron and Metoclopramide on post-operative nausea and vomiting in laparoscopic surgery.

METHODS

PubMed, google scholar were used to search for studies on the effects of Ondansetron *versus* Metoclopramide in laparoscopic surgeries. Free text and MeSH terms 'Metoclopramide', 'Ondansetron', 'PONV, and 'Laparoscopic Surgeries' were used individually and in various combinations. Pediatrics, endoscopic ear surgeries and operation under neuraxial anesthesia were excluded from this study. Four studies were eligible of mentioned criteria.
Data of this study were compiled and analysed by descriptive statistics using Microsoft Excel to clarify the difference between the efficacy of Ondansetron and Metoclopramide in laparoscopic surgeries.

RESULTS

Overall, four studies (comprising 979 patients, ondansetron= 404 and metoclopramide= 423) met the inclusion criteria show that Ondansetron is notably more effective than metoclopramide in preventing nausea and vomiting. Table 1 shows the summary of the meta-analyzed RCTs and baseline characteristics of the patients, respectively.

Table 1. The summary of the included studies

Study ID	Country	Metoclopramide group	Ondansetron group	Conclusion	Ref
(Sandhu *et al*., 2008)	Thailand	(36/80) 45%	(16/80) 20%	The efficacy of Ondansetron 4 mg, administered intravenously is shown to be effective for preventing vomiting after laparoscopic cholecystectomy at the end of surgery.	[5]
(Raphael & Norton, 1993)	USA	(35/123) 28%	(13/123) 13%	Metoclopramide was not as effective in preventing nausea and vomiting as ondansetron.	[6]
(Isazadehfar *et al*., 2017)	Iran	(13/30) 43.3 %	(10/30) 33.3 %	The effectiveness of Ondansetron is superior to metoclopramide.	[7])
(Diemunsch et al., 1997)	France	(339/746) 32%	(365/746) 49%	For all evaluation criteria, Ondansetron was well tolerated and more effective than metoclopramide.	[8]
Total		(423/979) 43%	(404/979) 41%		

DISCUSSION

This study examined the efficacy of ondansetron *versus* metoclopramide for the management of PONV. Ondansetron and metoclopramide are both medications commonly used to prevent and treat postoperative nausea and vomiting (PONV). However, they have different mechanisms of action and potential side effects. The antiemetic mechanism can be either central or peripheral. Drugs used for the treatment of PONV are usually antihistaminics, anticholinergics, dopamine receptor antagonists, and 5HT3 antagonists [9]. Ondansetron belongs to a class of drugs called serotonin 5-HT3 receptor antagonists. It works by blocking serotonin receptors in the gut and central nervous system, reducing the sensation of nausea and vomiting. Ondansetron is considered highly effective in preventing PONV. Metoclopramide is a prokinetic agent that acts by increasing the movement of the stomach and intestines, reducing the likelihood of nausea and vomiting. While it is effective in some cases, its efficacy for preventing PONV is generally considered less potent compared to ondansetron [10].
Ondansetron performs better than metoclopramide in terms of outcome, although this study only reveals minor and negligible differences between the ondansetron (41%) and metoclopramide (43%) groups. It has been shown that weakness and akathisia were noted as adverse effects of metoclopramide usage. However, ondansetron usage did not appear to have any negative side effects. Ondansetron usage also shown a shorter observation period and less frequent admission to the emergency room [11]. A recent study has postulated that combination of metoclopramide and ondansetron could be a proper antiemetic regimen [12].

CONCLUSION

Ondansetron is typically well accepted, has less noticeable side effects, and is thought to be quite efficient at preventing PONV. On the other hand, metoclopramide may be less effective in avoiding PONV and is more likely to have negative

side effects, particularly neurological ones. However, a number of variables, such as the patient's individual characteristics and medical history, influence the decision between these treatments.

Conflict of Interest

There are no financial, personal, or professional conflicts of interest to declare.

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فعالية أوندانسيترون وميتوكلوبراميد في علاج الغثيان والقيء بعد العمليات الجراحية بالمناظير

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المستخلص

يعد الغثيان والقيء من أحد أكثر المشـــاكل تعقيدًا وخطورة اثناء التخدير والعمليات الجراحية ان لم يكن هناك تدخل وقائي. ونســـبة حدوثه قد تصـــل الى ثلث المرضـــى تحت التخدير العام. تهدف هذه الدراســـة إلى المقارنة بين فعالية أوندانســـيترون وميتوكلوبراميد على الغثيان والقيء بعد عمليات جراحة المناظير. تم دمج بيانات أربع دراســـات بإجمالي 979 مريض. ثم تم تحليل وحســـاب معدل حدوث الغثيان والقيء بعد الجراحة لكل من المرضى بحسب نوع الدواء (لأوندانسيترون وميتوكلوبراميد). أظهرت النتائج أن نسبة حدوث الغثيان والقيء بعد الجراحة في مجموعة مرضـــى الميتوكلوبراميد كانت (979/423) 43% بينما مجموعة مرضـــى الأوندانسيترون كانت (979/404) 41%. لم يكن هناك فرق واضح بين المجموعتين. ومع ذلك، كان الأوندانسيترون فعالاً بشكل طفيف من الميتوكلوبراميد في تقليل حدوث الغثيان والقيء بعد الجراحة.

الكلمات المفتاحية. الغثيان والقيء بعد الجراحة وأوندانسيترون وميتوكلوبراميد.