Ondansetron in the prophylaxis of postoperative vomiting: a meta-analysis

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Authors' objectives
To assess the effectiveness of prophylactic ondansetron for the prevention of vomiting, and on the incidence of headache when used post-operatively.

Searching
MEDLINE was searched from January 1990 to July 1997 using the keywords 'vomiting', 'ondansetron', and 'surgery' and/or 'anesthesia/anaesthesia'. Studies published in any language were considered. Abstracts and unpublished studies were excluded from the search. A scan of the retrieved articles revealed no additional studies.

Study selection
Study designs of evaluations included in the review
The included trials were prospectively randomised and placebo-controlled, divided into early (up to 8 hours post-operative) and late (up to 24 hours post-operative) evaluation.

Specific interventions included in the review
Ondansetron administered orally or intravenously, at doses of 1 to 16 mg, versus placebo.

Participants included in the review
The participants were adults (34 studies) and children aged up to 18 years (13 studies), who were undergoing a variety of surgical interventions.

Outcomes assessed in the review
The presence or absence of vomiting and/or retching was the selected end point. The incidence of headache was reported only when specifically described in a study.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the authors performed the selection.

Assessment of study quality
The authors used the decision of the respective editorial boards of the selected published articles as the only merit requirement for inclusion in the review. No validity assessment was carried out.

Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction. The incidence of vomiting in the ondansetron group, versus the placebo group, was evaluated statistically for each individual study using either the chi-squared test with Yates' correction or Fisher's exact test.

Methods of synthesis
How were the studies combined?
The results of the studies were reported as odds ratios (ORs) with 95% confidence interval (CIs). The combined OR was calculated using either a fixed-effect or random-effects model, depending on the heterogeneity. The numbers-needed-to-treat (NNT) were also calculated. An OR greater than 1 indicated a higher anti-emetic efficacy in the ondansetron group.
How were differences between studies investigated?
The authors used a chi-squared analysis to test for heterogeneity, in conjunction with a subjective appraisal of the consistency across studies.

Results of the review
Forty-eight randomised controlled trials with 7,793 patients in the ondansetron group and 4,285 in the placebo group, were included. There were 34 studies (n=10,390) of adults and 13 (n=1,688) of children.

The 1 mg dose of ondansetron, although better than placebo, did not have a superior therapeutic effect; the OR was 1.24 (95% CI: 0.97, 1.58) for oral administration and 1.34 (95% CI: 1.04, 1.74) for intravenous administration.

The doses most frequently employed were 4 and 8 mg. Overall, the 4 mg dose of ondansetron was found to be effective; there was no evidence that the drug became more effective at the higher doses.

Early evaluation: for the intravenous administration of ondansetron (4 mg), the OR was 1.77 (95% CI: 1.37, 2.29) and the NNT was 7.91.

Late evaluation: for the oral administration of ondansetron (4 mg), the OR was 1.54 (95% CI: 1.20, 1.97) and the NNT was 10.91.

Late evaluation: for the intravenous administration of ondansetron (4 mg), the OR was 2.91 (95% CI: 2.23, 3.81) and the NNT was 5.72.

The overall percentage for vomiting in the placebo group was 47.87%.

The incidence of headache (35 studies) was 7.05% in the ondansetron group versus 6.16% in placebo group.

Authors' conclusions
While ondansetron is an effective anti-emetic with minimal adverse effects, the NNTs obtained for prophylaxis of post-operative vomiting should be considered in future cost-effective strategies of post-operative treatment. The profile that ondansetron presents with respect to the minimum of adverse effects makes it the drug of choice and, in lieu of any newer anti-emetics of greater effectiveness, it is a valid option. One single dose of 4 mg ondansetron, administered intravenously, is sufficient for 24 hours of protection. The optimum moment for its administration has yet to be determined.

CRD commentary
This was a reasonably good systematic review of the current literature. The authors clearly stated their research question. There were no language restrictions placed on the search, but the authors did exclude unpublished data and abstracts of studies. In addition, they limited their literature search to one database (MEDLINE). A funnel plot suggested that additional studies may have been missed. [A:Additional studies by the authors of this review of ondansetron have since been published (see Other Publications of Related Interest).] The selection criteria were stated but the authors did not perform any formal quality scoring of the included studies. It was also not reported as to who made the selection and inclusion judgements, or who extracted the data.

The method used to combine the studies was appropriate, and tests for heterogeneity were conducted. To address possible publication bias, the authors performed analyses based on two groups of studies: one where the number of patients in each study was below the overall mean and those above the mean. They also calculated an overall NNT.

The authors’ conclusions follow from the results. However, they should be viewed with caution because of the lack of transparency in the performance of the review, and the possibility that additional relevant studies may have been missed.
Implications of the review for practice and research
Practice: The authors state that the recommendation of 4 mg of ondansetron for the prophylaxis of post-operative vomiting is corroborated by the results of this review. They also suggest that higher doses should be reserved for patients with a prior history of post-operative nausea and vomiting.

Research: The authors did not state any implications for further research.

Bibliographic details

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Other publications of related interest

Indexing Status
Subject indexing assigned by NLM

MeSH
Administration, Oral; Adult; Antiemetics /administration & dosage /adverse effects /therapeutic use; Child; Female; Follow-Up Studies; Headache /chemically induced; Humans; Incidence; Injections, Intravenous; Male; Odds Ratio; Ondansetron /administration & dosage /adverse effects /therapeutic use; Placebos; Postoperative Complications /prevention & control; Prospective Studies; Randomized Controlled Trials as Topic; Risk Factors; Treatment Outcome; Vomiting /prevention & control

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.