FPIN's Clinical Inquiries

Treatment of Motion Sickness

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Clinical Inquiries provides answers to questions submitted by practicing family physicians to the Family Physicians Inquiries Network (FPIN). Members of the network select questions based on their relevance to family medicine. Answers are drawn from an approved set of evidence-based resources and undergo peer review. The strength of recommendations and the level of evidence for individual studies are rated using criteria developed by the Evidence-Based Medicine Working Group (http://www.cebm.net/?o=1025).

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Clinical Question

What is the best medication for the treatment of motion sickness?

Evidence-Based Answer

Scopolamine should be used to reduce nausea associated with motion sickness, but it does not reduce vomiting. (Strength of Recommendation [SOR]: A, based on multiple randomized controlled trials [RCTs].) First-generation antihistamines (dimenhydrinate and chlorpheniramine) can also be used to reduce nausea associated with motion sickness. (SOR: B, based on multiple RCTs.) Scopolamine is more effective than meclizine (Antivert) and as effective as dimenhydrinate. Ondansetron (Zofran) and the second-generation antihistamines cetirizine (Zyrtec) and fexofenadine (Allegra) do not reduce symptoms of motion sickness and should not be used. (SOR: B, based on small RCTs.) Ginger can be used to reduce symptoms of motion sickness. (SOR: B, based on RCTs with conflicting results.)

Evidence Summary

SCOPOLAMINE

A Cochrane review of 14 RCTs with a total of 1,025 participants who had sea- or lab-induced motion sickness compared scopolamine with placebo and various other agents.[1] Scopolamine reduced nausea more than placebo (relative risk reduction = 0.47; 95% confidence interval, 0.31 to 0.71) but did not reduce vomiting. Patients receiving scopolamine were more likely to have dry mouth (a 22 to 50 percent increase). Three of the RCTs compared scopolamine with antihistamines. Two studies found scopolamine to be superior to meclizine, and one found it to be equivalent to dimenhydrinate.[1]

FIRST-GENERATION ANTIHISTAMINES

Numerous histamine H_1 receptor antagonists are available over the counter and by prescription, including dimenhydrinate, chlorpheniramine, diphenhydramine (Benadryl), and meclizine. One small RCT (n = 16) found that dimenhydrinate reduced nausea scores more than placebo, and another found that high-dose (12-mg) chlorpheniramine reduced the risk of severe malaise more than placebo[2,3] *(Table 1*[1-10]*)*. A higher incidence of dry mouth was found with dimenhydrinate, and more sedation was reported with chlorpheniramine.

SECOND-GENERATION ANTIHISTAMINES

One RCT with 18 healthy participants evaluated the second-generation, nonsedating antihistamines cetirizine and fexofenadine in lab-induced motion sickness, and found no statistically significant difference in motion sickness scores compared with placebo.[4]

ONDANSETRON

Two well-designed RCTs that included a total of 86 participants with sea- or lab-induced motion sickness found that ondansetron did not reduce motion sickness symptoms compared with placebo.[5,6]

GINGER

Two higher-quality, placebo-controlled RCTs found that ginger reduced vomiting (but not nausea) in the larger trial, and delayed the onset and reduced the intensity of nausea in the smaller trial.[7,8] Two older RCTs comparing ginger with placebo for lab-induced motion sickness produced conflicting results; one found that ginger delayed the onset of nausea, whereas the other found no difference in severe malaise.[9,10] ▶

Table 1. Randomized Controlled Trials of Motion Sickness Medications vs. Placebo

Medication	*Number of participants*	*Motion stimulus*	*Outcome measured*	*Results*
Scopolamine (various delivery methods)[1]	1,025	Sea- and lab-induced	Nausea	Relative risk reduction = 0.47* (95% confidence interval, 0.31 to 0.71)
Dimenhydrinate[2]	16	Lab-induced	Nausea symptom score (0 to 100)	60-point reduction in nausea score compared with 17-point reduction with placebo ($P < .005$)†
Chlorpheniramine (4 mg and 12 mg)[3]	18	Lab-induced	Rotating time, severe malaise	Increased rotating time in high- and low-dose groups; NNT = 4 in high-dose group ($P = .01$)‡
Cetirizine (Zyrtec), fexofenadine (Allegra)[4]	18	Lab-induced	Motion sickness scores	No significant difference
Ondansetron (Zofran)	60[5]	Lab-induced	Rotating time, symptom scores	No significant difference
	16[6]	Sea-induced	Symptom scores	No significant difference
Ginger (1 g powdered root)[7]	79	Sea-induced	Vomiting, cold sweats, nausea, vertigo	NNT = 19 to prevent vomiting and cold sweats ($P < .05$)‡; no reduction in nausea or vertigo
Ginger (1- or 2-g capsules)[8]	18	Lab-induced	3-point nausea score, time to onset of nausea	1-point decrease in maximal nausea score ($P < .05$); 2.9- and 4.1-minute increase in time to onset of nausea ($P < .05$)†
Ginger (940 mg powdered root)[9]	36	Lab-induced	Rotating time	4.1-minute increase ($P < .001$)†
Ginger (500 to 1,000 mg powdered or fresh root)[10]	28	Lab-induced	Severe malaise	No significant difference

NNT = number needed to treat.

**—Raw data not available for calculation of NNT.*

†—*Continuous data; risk reductions and NNT not calculated.*

‡—*Confidence intervals were not reported.*

Information from references 1 through 10.

Recommendations from Others

Based on a summary of the evidence and expert opinion, UpToDate recommends the use of sedating antihistamines, scopolamine, or ginger for the treatment of motion sickness.[11]

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