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The effect of oral hydration on the risk or aspiration and hemodynamic stability before the induction of anesthesia: A systematic review and meta-analysis

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ABSTRACT

Objective: Preoperative oral rehydration solutions (ORS) are frequently used in clinical practice in Japan, although their effect remains to be explained. The purpose of this study was to investigate the clinical outcomes associated with ORS usage.
Design: Systematic review and meta-analysis.
Setting: Surgical departments at each hospital.
Participants: A total of 546 patients with American Society of Anesthesiologists physical status classification I or II (non-pregnant adults only) reported in six articles.
Interventions: Patients in the included studies had originally been randomly allocated to the ORS or control group.
Measurements: Incidence of aspiration and vomiting during induction of anesthesia, gastric fluid volume (absolute volume), gastric pH, stroke volume variation (SVV) during induction of anesthesia. Risk difference (RD) or mean difference (MD) with 95% confidence interval (CI) were calculated using a random effects model.
Main results: There was no aspiration or vomiting in either group [3 studies, 428 patients, RD 0 (95% CI −0.01 to 0.01), I^2 = 0%]. ORS administration caused no significant difference in gastric volume [4 studies, 486 participants, MD −1.12 ml (95% CI −5.61 to 3.36), I^2 = 62%] or gastric pH [4 studies, 486 participants, MD −0.03. (95% CI −0.37 to 0.31), I^2 = 0%] compared with the control group. In contrast, ORS resulted in a significant reduction in SVV during the anesthesia induction period [3 studies, 118 participants, MD −3.02 (95% CI −5.44 to −0.59), I^2 = 65%].
Conclusions: Our systematic review indicates that oral rehydration therapy does not increase the risk of aspiration or vomiting. In contrast, it may help stabilize circulatory dynamics during anesthesia induction.

1. Introduction

Perioperative fluid overload to compensate for a patient's inability to engage in oral ingestion for a prolonged time is reported to slow recovery after surgery, which is why protocols for enhanced recovery after surgery (ERAS) are being developed [1]. With some ERAS protocols that provide carbohydrate (CHO)-rich fluids preoperatively, it has been reported that postoperative insulin resistance is reduced, leading to the patient's increased ability to recover postoperatively [2,3]. The aggravation of insulin resistance increases the incidence of perioperative infection and is thus associated with a poor prognosis [4]. It may also inhibit circulation changes during induction and may decrease the perioperative infusion volume [5].

In Japan, oral rehydration solutions (ORSs) are generally prescribed before surgery instead of CHO-rich drinks. Because the compositions of ORSs are clearly different from those of the CHO-rich drinks, an equivalent clinical response may not be obtained. Nevertheless, no meta-analysis has focused on the use of perioperative ORSs. Hence, the purpose of this study was to investigate the effect of preoperative ORS administration using Cochrane methodology. We therefore planned to have two groups—one that had been administered ORS preoperatively and another that had remained fasting—to compare the use of ORS versus fasting regarding the risk of aspiration and circulatory dynamics at the induction of anesthesia.

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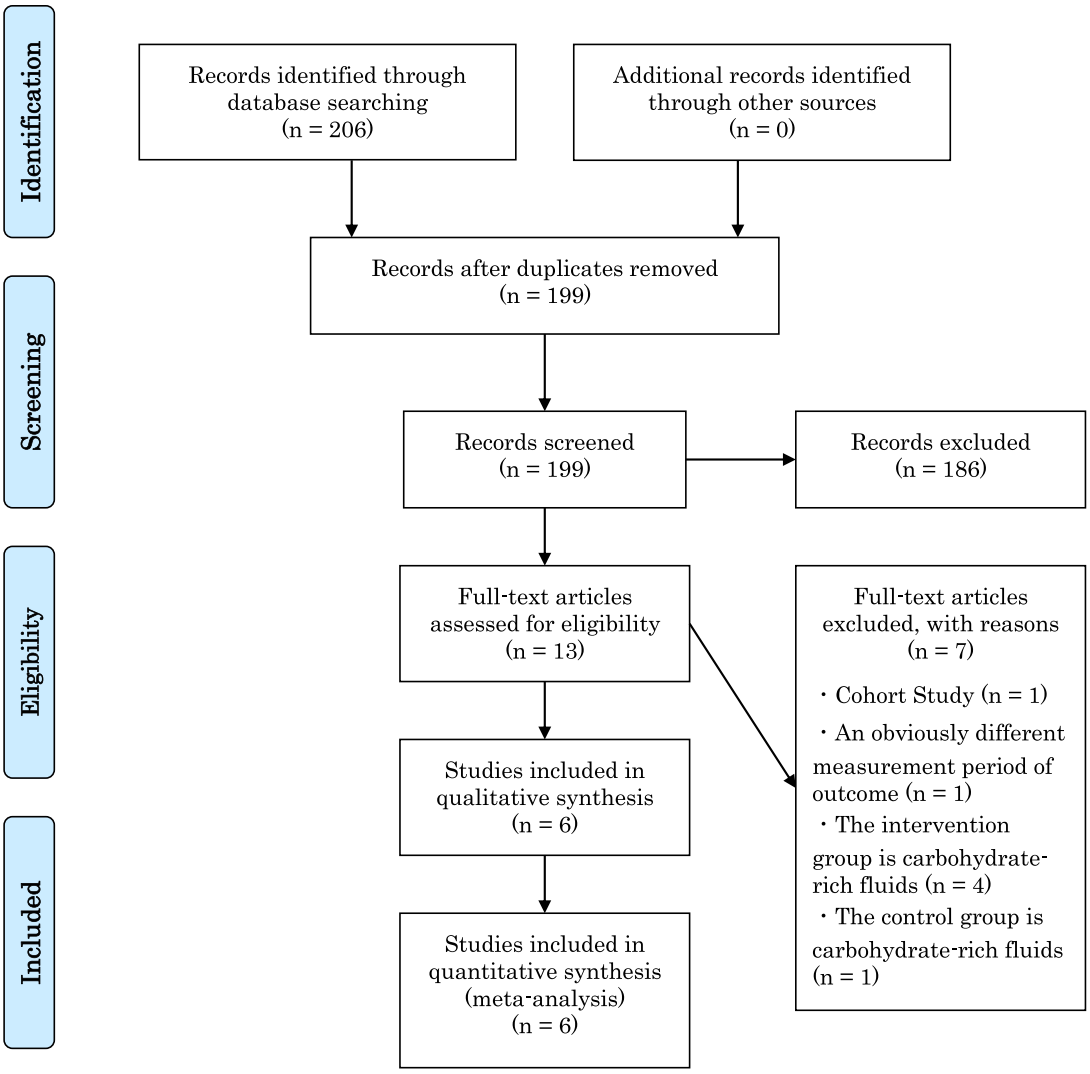

Fig. 1. Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) flow diagram.

2. Methods

This article adheres to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement [6], except that we could not complete the preregistration of our protocol. We conducted this review referring to the Cochrane Handbook for Systematic Reviews of Interventions [7].

2.1. Data sources and searching strategy

The MEDLINE (PubMed), Cochrane Central Register of Controlled Trials (CENTRAL), and Japana Centra Revuo Medicina (Igaku Chuo Zasshi) databases were searched from inception up to and including November 2016 to identify relevant articles and abstracts. There was no language restriction on the search. The strategies (Supplemental Table 1) used in our search included randomized controlled trials (RCTs) that investigated preoperative ORS effectiveness in patients undergoing general anesthesia. The bibliographies of all relevant articles were reviewed manually to identify additional relevant articles.

2.2. Study selection

Two reviewers independently performed the process of study selection. Inclusion criteria on study design, participants, interventions, and outcomes were as follows: (1) the study was an RCT; (2) participants were patients scheduled to undergo general anesthesia; (3) interventions were ORS (e.g., OS-1®; Otsuka Pharmaceutical Co., Otsuka, Japan) administration versus a control group (e.g., no drink or water intake); (4) outcome measures included the incidence of aspiration and vomiting at the induction of anesthesia (primary) as well as gastric volume, gastric pH, and stroke volume variation (SVV). Studies that included patients who had an intake of highly concentrated CHO-rich beverages (e.g., Arginaid Water®, Nestle Health Science Co., Tokyo, Japan) were excluded, as were studies that focused on animal or experimental studies or that were published as a review or editorial.

2.3. Data extraction

Data extraction was performed independently by two authors. Data were extracted using a standard scoring sheet that included the following variables: first author, publication year, type of study, study location, patient demographics, study size, exclusion criteria, ORS volume, and outcome information. Data were extrapolated and adjusted from figures or tables as needed. We also extracted information related to the outcomes described in Section 2.2.