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Original Article

High Intravenous Fluid Therapy Prevents Post-Tonsillectomy Nausea and Vomiting

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Abstract

Background: Post-operative nausea and vomiting (PONV) following surgical operations requiring general anesthesia are common and distressing. The incidence of PONV may be as high as 70% during the first 24 hrs of tonsillectomy.

Objective: This study determines the effects of intraoperative well-hydration on postoperative nausea and vomiting.

Methods: 90 ASA I patients with age of 6-12 years scheduled for tonsillectomy under general anesthesia randomly assigned to receive either routine iv fluid plus intraoperative well-hydration plus 4 ml/kg/h Ringer's solution (well hydrated group; n=45) and routine iv fluid requirements (control group; n=45). All study preparations were administered in a double-blinded fashion.

Results: During the first postoperative day, the incidence of nausea and vomiting were significantly lower in the well-hydrated group as compared with control ($p<0.05$). There was no significant differences between males and females regarding the incidence of nausea and vomiting ($p>0.05$).

Conclusion: The present study showed that well-hydration reduces the incidence of post tonsillectomy nausea and vomiting, and high iv fluid therapy is a simple, effective, safe and well-tolerated technique for prevention of postoperative nausea and vomiting.

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Keywords • Nausea • vomiting • postoperative • tonsillectomy• fluid therapy

Introduction

Although, postoperative nausea and vomiting (PONV) rarely result in serious harm to the patients, nevertheless such symptoms are viewed as extremely unpleasant. The incidence of PONV can be as high as 70% during 24 hours of tonsillectomy.[10] This rate is influenced by a variety of factors including gender, age, anesthetic technique, use of opioids and the type of surgery.[1] The efficacy of various pharmacologic agents in preventing PONV has been extensively studied. Traditional medications such as droperidol or metoclopromide used to manage PONV, have a variety of undesirable side effects including excessive sedation, extrapyramidal symptoms, hypotension, and dysphoria.[8,9] Recently, serotonin antagonists have been shown to be effective in both

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Table 1: Demographic data and Duration of Anesthesia (Mean±SD)

	well-hydrated	Control
Male/ Female	23/ 22	22/ 23
Age (yr)	8±3	9±3
Duration of anesthesia (mn)	52±23	53±25

* Differences are not significant

prevention,[6] and treatment of PONV with little or no undesirable side effects[11]. However, all studies consistently find that medications, including serotonin antagonists, are not universally effective for prevention of PONV. When general anesthesia is induced and maintained with propofol, incidences of PONV have been reported less frequent than with other anesthetic techniques[3,4]. A recent study suggests that dehydration may be a precipitating factor in the occurrence of PONV.[12] Studies have shown that the functional extracellular fluid volume is reduced in both minor and major type of surgeries. Preoperative fasting can lead to a large fluid depletion, e.g. an 8 hr fasting in a patient weighing 25 kg may cause at least a 500ml fluid loss. The risk of dehydration is greater in patients receiving preoperative bowel preparation, elderly, children and those with ascites, burns, trauma, bowel obstruction or peritonitis.

In 1995, Yogendran et al, investigated the impact of preoperative fluid status on clinical outcomes of 200 ASA I-III ambulatory surgical patients that were randomized into two groups who received high (20 ml/kg) or low (2ml/kg) infusion of isotonic electrolytes preoperatively and the outcomes were assessed at 30 and 60min after surgery, at discharge and on the first postoperative day. The incidence of nausea, vomiting, thirst, drowsiness and dizziness were significantly lower in the high infusion group.[12]

Methods

After approval by the legal and ethical committee, of Urmia University of Medical Sciences, an informed consent was obtained. Ninety ASA I patients (6-12 years old) with normal body mass index (BMI) scheduled for tonsillectomy under general anesthesia, were enrolled in this prospective randomized, double blinded, placebo-controlled study. Prior to the study, basic demographic information including age, height and weight was collected from each patient. Patients with history of motion sickness, PONV and recent common cold were excluded. Upon enrollment, patients were divided into two equal groups 45, and randomized for intraoperative treatments. Well-hydrated group received high iv fluid (4ml/kg) and control group were given routine maintenance fluids. Prior to induction of anesthesia, all patients were premedicated with, 0.02 mg/kg atropine and underwent anesthesia with 5mg/kg sodium thiopental intravenously. Orotracheal intubations were facilitated with 0.6mg/kg atracurium and anesthesia was maintained with 2 µg/kg fentanyl, 0.75% halothane and 50% nitrous oxide in oxygen. After reversal of residual neuromuscular block, all children were extubated while still awake. For prevention of postextubation stridor and laryngospasm following tonsillectomy, all patients received 1 mg/kg iv lidocaine immediately prior to extubation. The surgical procedure was performed in the same fashion and by cold dissection technique in all cases. Bleeding sites in the tonsillar fossa were coagulated with diathermy. The patients were randomized into two groups, for whom the following solutions were administered during the operation. Well-hydrated group received Ringer´s solution according to routine administration, an infusion of 5ml/kg Ringer`s solution to compensate intravascular volume expansion (CVE), maintenance fluid by the rule of 4, 2, 1, as well as 3 ml/ml for restoration of blood loss in addition to 4ml/kg/hr given intraoperatively. The control subjects received iv Ringer´s solution similar to well-hydrated group without an additional 4ml/kg/h. The infusion of maintenance intravenous fluids continued up to 6 hrs postoperatively, and thereafter the administration of iv fluid was discontinued and the patients were allowed to take oral fluid. All episodes of nausea and vomiting, in the first 24 hrs after operation, were evaluated on recovery by the nursing staff, who were blinded to the procedure and were aware of the nature of the study. The data were recorded on a flow sheet and postoperative nausea and vomiting were treated by intravenous metoclopramide (0.15 mg/kg). All patients were discharged the day after surgery.

Statistical analysis

Data are presented as mean±SEM. Data analysis was performed by the Chi square and Student's t-tests. In all cases, $p<0.05$ was considered significant.

Results

Demographic data and duration of anesthesia are summarized in Table 1. No significant differences were observed among groups regarding age, gender and duration of anesthesia. The incidence of vomiting in well-hydrated group was 22.2% (10/45) and in control group

Table2: The incidence of postoperative nausea and vomiting in males and females

Group		Vomiting	Nausea
Well-hydrated	Male	4	7
	Female	6	8
Control	Male	9	16
	Female	12	13

46.6% (21/45); p<0.05. The incidence of nausea in well-hydrated group was 33.3% (15/45) and in control group 64.4% (29/45); p<0.05. As shown in table 2 no significant differences were found between males and females regarding the incidence of nausea and vomiting.

Discussion

This study found that intraoperative high iv fluid therapy decreased the incidence of post tonsillectomy nausea and vomiting compared with control group with routine administration of iv fluid. Those patients that received high iv fluid intraoperatively, 6 hrs after operation, had less thirst and therefore, less demand for oral intake of fluids. On the other hand, the patients of group II, who received less iv fluids demanded more oral fluid intake. It is suggested that, the excessive requirement of patients, in group II, for drinking led to increasing incidence of PONV as described elsewhere.[5] This finding is consistent with the report of Yogendran et al, who concluded that patients receiving high amount of fluid preoperatively, were prone to postoperative nausea and vomiting.[12] In their study, the incidence of postoperative nausea, on the day of discharge, in high iv fluid group, was reduced by 66.6% compared with that of low iv fluid patients. In our study, the incidence of postoperative nausea in well hydrated group decreased by 48.2%.

Berry, outlining the causes and treatment of postoperative nausea and vomiting, advocated a delay of 6-8 hours of oral administration of fluids after operation. He recommended the hydration of children, up to 3 years old, with 25ml/kg/h, at the first hour, and thereafter 15ml/kg/h postoperatively. As for the hydration of older children, he suggested 15 ml/kg/hr, for the first hour followed by 10 ml/kg/h postoperatively which reduced the incidence of nausea[2]. Discharging patients along with *ad libitum* administration of iv therapy eliminated the compulsory drinking by the patients.[7]

In our study, the incidence of postoperative vomiting in well-hydrated group decreased significantly as compared with control group (22.2% vs. 46.6%). On the other hand, the incidence of postoperative nausea in well-hydrated group decreased as compared with control group (33.3% vs. 64.4%). In conclusion, well-hydration reduces the incidence of post-tonsillectomy nausea and vomiting. High iv therapy is therefore, suggested to be a simple, effective, safe and well-tolerated technique to prevent post-tonsillectomy nausea and vomiting.

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