

Title: ALKA-SELTZER^R FOR PROPHYLACTIC USE IN PREVENTION OF ACID ASPIRATION PNEUMONIA

Authors: C. T. Chen, M.D., T. J. Toung, M.D., J. L. Cameron, M.D.

Affiliation: Departments of Anesthesiology, Community Health Center of Branch County, Coldwater, MI 49036 and Departments of Anesthesiology and Critical Care Medicine, and Surgery, The Johns Hopkins Medical Institutions, Baltimore, MD 21205

Introduction: It has been proposed that the patient about to undergo emergency surgery should have the acid component of his gastric contents neutralized. This is to avoid the harmful pulmonary consequence of acid injury should aspiration occur. Because of better mixing, it is generally agreed that an aqueous form of antacid is superior to an emulsion type of antacid for diminishing gastric acidity. However, at present there is no regimen or pharmacological compound that is generally accepted as appropriate. Sodium citrate and sodium bicarbonate are two agents that have most frequently been used. In this study, the efficacy of Alka-Seltzer^R, a mixture of sodium bicarbonate and citric acid, was evaluated in patients for emergency surgery.

Methods: Forty patients admitted for emergency surgery (orthopedic, general surgery) ranging in age from 16 to 70 years were studied. The patients were NPO from 1 to 6 hours prior to the induction of general anesthesia. The patients were divided into 2 groups in an alternative basis. Group A: 20 patients, served as control. No Alka-Seltzer^R was given preoperatively. General anesthesia was induced with a rapid sequence technique. Immediately after endotracheal intubation, a salem sump nasogastric tube was placed. Gastric contents were thoroughly aspirated for determination of volume and pH. Group B: 20 patients. Patients received 2 tablets of Alka-Seltzer^R effervescent antacid in 30 ml of water 30 minutes prior to surgery. After endotracheal intubation following a rapid sequence induction technique, a salem sump nasogastric tube was inserted. The volume of gastric contents and pH were measured. Student's t test was used for the statistical analysis of the data.

Results: The age and sex distribution, weight and hours of NPO in the 2 groups were similar. Table 1 summarized the findings. Group A: The volume of gastric juice ranged from 15 to 800 ml (mean 84 ml). Sixty five percent (13 patients) had volume greater than 25 ml. The pH of the gastric juice ranged from 1.0 to 4.5 with 75% (15 patients) lower than 2.5. Forty-five percent of patients (9 patients) had both a pH less than 2.5 and a volume greater than 25 ml. Group B: The volume of gastric juice ranged from 15 to 600 ml (mean 68 ml). In all patients, the pH of gastric juice was greater than 4.0 (4.0 to 6.5). The difference in pH between the 2 groups was statistically significant ($p < 0.01$).

Discussion and conclusion: The preoperative management of the patient with a full stomach for emergency surgery is important. Aspiration of over 25 ml of gastric contents of low pH (less than 2.5)

can cause significant pulmonary injury. One possible means of prevention is to neutralize the gastric juice pH. Alka-Seltzer^R consists of sodium and potassium bicarbonate and citric acid in a dry tablet and is converted mainly to sodium citrate when dissolved in water. It is capable of providing a rapid and sustaining neutralization and buffering of gastric hydrochloric acid. Metabolic problems associated with long-term or excessive use of this agent, namely sodium overload, systemic alkalosis, and citrate toxicity, are not relevant in the single dose administration in emergency surgery.

In this study, the agent effectively raised the gastric juice of every patient above the critical level of 2.5. When 2 tablets of Alka-Seltzer are dissolved in 30 ml of water they generate almost the same amount of sodium citrate (2100 mg vs 2332 mg) as 30 ml of a 0.3 molar solution of sodium citrate. The osmolarity of this solution is 1320 mOsm/ml (calculated), which is considerably lower than that of sodium bicarbonate injection, U.S.P. (8.4% 2000 mOsm/ml). This latter agent had been shown to cause a pulmonary reaction resembling 1/10 N hydrochloric acid aspiration in animals. A study of Alka-Seltzer^R aspiration is currently being conducted in our laboratory.

Table 1 Gastric residual volume and acidity in patient with and without Alka-Seltzer^R

| | pH < 2.5 | | volume > 25 ml | | pH < 2.5 and volume > 25 ml | |
|-------------------|----------|-----|----------------|----|-----------------------------|-----|
| | No. | % | No. | % | No. | % |
| Group A (n=20) | 15 | 75* | 13 | 65 | 9 | 45* |
| Group B (n=20) | 0 | 0* | 14 | 75 | 0 | 0* |

* Significantly different ($p < 0.01$)

Group A: control Group B: Alka-Seltzer^R