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The effects of midazolam pre-medication on gastric acidity and gastric contents in children prior to anesthesia

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ABSTRACT

The aim of this study was to investigate the effects of Midazolam pre-medication as an oral premedication on the gastric content acidity (PH) prior to anesthesia and decreasing the risk of aspiration pneumonitis. Sixty patients who were scheduled for surgery with ASA I and II (aged 1-10 years old) were randomly assigned to one of three groups. Group I (control, n=20) received nothing per oral (PO). Group 2 (placebo, n=20) received 2cc/kg of apple juice (clear fluid) .Third group (midazolam, n=20) received 0.5mg/kg midazolam with 2cc/kg apple juice. The volume of gastric content and pH were measured with a graduated syringe and pH strips, respectively (Merck Company, Darmstadt, Germany). Student T- test were used for statistical analysis. There was no statistical difference between the ages and weights. After premedication statistically significant difference was found regarding the gastric volumes in the groups ($p<0.014$) .In addition gastric pH had not significant difference ($P<0.05$) in group 3 (5.07 ± 0.86) in comparison to group 1 (2.84 ± 0.81). It is concluded that using midazolam pre-medication cannot increase gastric PH but it can decrease gastric volume and can have effect on reduction of the risk of aspiration pneumonitis during anesthesia in children prior to anesthesia.

Key words: Oral premedication; Midazolam; Sedation; Gastric content; pH; Acidity; Residual volume

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INTRODUCTION

Aspiration pneumonitis, a chemical injury to the tracheobronchial tree due to aspiration of sterile acidotic gastric contents, is considered as one of the complications during the operation and anesthesia [1,2]. It is a serious threat for the patient and lots of efforts like fasting before anesthesia, prophylactic medication (such as antacids or H2 antagonists), rapid sequence induction of anesthesia with application of cricoid pressure, and the use of a cuffed tracheal tube have been made to reduce its complication since 1946 [1,3]. Mortality and morbidity of pulmonary aspiration depend on different variables such as physical status of the patient, the type and volume of aspirated content, the medication administered, and the criteria using for diagnosis [4]. Results of previous investigations demonstrated that the chemical nature of the gastric content and also its volume have considerable importance [5-8]. Recent studies revealed that outpatients may have increased the risk of aspiration if the volume of their gastric content was greater than 25 mL and pH was less than 2.5 [9-12]. There are some studies which investigate different premedication such as Metoclopramide and Ranitidine for decreasing the gastric volume and increasing pH during anesthesia that reduced the risk of aspiration pneumonitis among patients who received sedation [13]. Therefore if

we increase the pH and decrease volume of the gastric contents during the anesthesia, we can get an effective step in prevention of the complications of aspiration.

Among drugs used as premedication, benzodiazepines are widely used in clinical anesthesia. Midazolam like other benzodiazepines has its effect due to potentiating of neural inhibition that is mediated by gamma-amino butyric acid (GABA) and is used for sedation, decreasing anxiety, hypnosis, amnesia, centrally mediated muscle relaxation, anti-convulsant activity and also for induction of the anesthesia [14]. In addition, the oral form of this drug is acceptable and safe among pediatric groups [14-16].

This randomized, double-blinded study was undertaken to evaluate the effectiveness of prophylactic administration of midazolam on perioperative gastric contents (pH and residual volume) among children received anesthesia for outpatient surgeries.

MATERIALS AND METHODS

Sixty healthy children with ASA physical status class Ⅰ and Ⅱ, between the ages of 3 and 10 years old, scheduled to undergo outpatient surgical procedure, were enrolled in this study. Informed parental consent was obtained at least 24 hrs before the operation. Children with gastrointestinal pathology were excluded. The patients were randomly divided into 3 equal groups (n=20). Children allocated to one of these three study groups using computer-generated random numbers: Group 1(n=20) received nothing per oral (PO), second group (n=20) received 2cc/kg of apple juice orally two hrs prior to induction of anesthesia, and the third group (n=20) received 0.5mg/kg of the midazolam with 2cc/kg apple juice orally two hrs prior to anesthesia. In these 60 children, anesthesia was induced via oxygen 50%, N2O 50% and Halothane 0.5-3% .Then, a multi-hole nasal or oral catheter was inserted in children's stomachs for suctioning gastric contents. The volume of gastric content was measured with a graduated syringe. Measurement of PH was made with pH strips (Merck Company, Darmstadt, Germany). The protocol was approved by the institutional review board and the ethics committee of Children's Hospital of Jahrom, Iran. The data were collected, analyzed and reported as mean and standard deviation (mean ±SD). Besides, Student T- test was used for comparison each two group in this study. P value less than 0.05 was considered as statistically significant. Data analysis was done with SPSS (version 15).

RESULTS AND DISCUSSION

The patients' demographic data are exhibited in Table-1. There were no statistically significant differences in these three groups regarding ages and weights.

As it is shown in table-2, there were significant differences between residual gastric volume (RGV) in group 1 compared to groups 2 and 3, For investigating the effect of midazolam, we compared group 2 and 3 with each other, Because these two group received equal apple juice (2cc/kg) and statistically significant difference was seen among gastric volumes(P=0.014).

As it is exhibited in table-2, median pH in group 3 (5.07±0.8627) was more than group 1(2.84±0.8165) and group 2 (3.565±0.7555). Also, there was no statistically significant difference between gastric pH in group 2 and 1 (p=0.851) and no significant difference was found between pH in group 3 and 2 (p=0.752). Also, the difference between group 3 and 1 was not significant (P=0.897).

Table-1: Age and sex in each treated group, group 1 received nothing per oral, group 2 received 2cc/kg of apple juice orally, and group 3 received 0.5mg/kg of the midazolam with 2cc/kg apple juice orally

Groups	Age (years)	Weight (kg)
Group 1	**5.4±2.7985**	**16.17±5.98**
Group 2	**5.87±2.97**	**15.7±6.50**
Group 3	**4.95±2.55**	**14.76±4.62**
Total	**5.40±2.76**	**15.54±5.69**

Table-2: Residual gastric volume (RGV) and pH in each treated group, group 1 received nothing per oral, group 2 received 2 cc/kg of apple juice orally, and group 3 received 0.5mg/kg of the midazolam with 2cc/kg apple juice orally

Groups	RGV	PH
Group 1	**2.8±0.76***	**2.84±0.81**
Group 2	**11.45±7.33**	**3.56±0.75††**
Group 3	**15.65±7.77**	**5.07±0.86†**
Total	**9.96±8.13**	**3.82±1.23**

** P<0.05, Group 1 vs. Group 2 and 3*
† P<0.05, Group 3 vs. Group 2 and 3
†† P<0.05, Group 2 vs. Group 1

Oral midazolam is a worthwhile premedication for children's sedation and anesthesia [16]. This study evaluated the effectiveness of prophylactic pre-medication of midazolam on perioperative gastric content (pH and residual volume) among pediatrics undergone anesthesia for outpatient surgeries.

Many studies were conducted to show the effects of midazolam on the pH and Gastric volume. Meakin et al. [17] showed the effectiveness of oral premedication consumption on gastric content before operation. Trimeprazine syrup (two hrs before surgery) and tablets (one hour earlier) decreased the risk of aspiration pneumonitis due to increase pH of gastric contents. Riva et al. [18] revealed no significant difference for pH and residual volume between premedicated patients (midazolam 0.75mg/kg with total water of 5 ml) and non-premedicated patients. Laydon et al. [19] concluded that using anxiolytic premedication like benzodiazepines was unlikely to affect the volume of gastric contents during anesthesia induction. Haavik et al' [20] study showed the relationship between oral premedication, preoperative anxiety and gastric contents in patients undergoing elective surgery. They concluded that benzodiazepines did not have any effect on gastric contents and PH. Although previous studies had yielded conflicting results, this study revealed evidence that similar to most of recent studies the pre-medication midazolam (0.5 mg/kg) had not any significant effects on increasing the pH and decreasing the acidity but it had effect on volume of gastric content. In another study, administration of 3mg/kg apple juice 2.6 hour before surgery showed decrease in gastric content and no difference in pH [21]. In our study no significant differences in residual volume and pH were found in non-premeditated patients.

CONCLUSION

In summary, it can be concluded that oral midazolam had not any effect on decreasing of the gastric acidity in children but it can decrease the gastric volume; therefore, it could have effect on prevention of the aspiration complication of the gastric content. Further studies with larger population are needed for getting more reasonable and acceptable results and finding good protocols for decreasing such complications of anesthesia.

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