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TITLE: **Safety of Oral Midazolam Premedication for use in Children**

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Introduction: Oral midazolam (M) is one of the most popular premedications for children undergoing surgery today. Although reports suggest minimal side effects the safety of oral M for routine premedication remains to be established in pediatric patients.[1,2] This study evaluated the safety of oral M premedication in children.

Methods: This randomized, double blind, placebo controlled study was approved by the Institutional Review Board and written parental consent was obtained. Forty unmedicated children (ASA I or II, ages 1-6 years) scheduled for ambulatory surgery (minor general or dental surgery cases) lasting less than 90 min. were studied. Children were randomly assigned to one of 4 groups (n=10 per group) and received a premedication diluted in 3-5cc of chocolate-cherry syrup . Group I received syrup alone (placebo); Group II received M 0.5 mg/kg ; Group III received M 0.75 mg/kg; Group IV received M 1mg/kg. The children were administered the medication/placebo orally 30 minutes prior to surgery and heart rate, systolic blood pressure, respiratory rate, and arterial O_2 saturation were measured every 5 min. for 30 min. after drug administration by a trained observer blinded to the treatment. Children were monitored for untoward effects such as apnea or airway obstruction. Anesthesia was induced by mask using 70% N_2O and halothane. The maintenance halothane concentration was titrated to the minimum required for hemodynamic stability. Postoperatively, hemodynamic and respiratory variables were recorded every 5 min for 15 min and then every 15 min for the remainder of 1 hr. Parametric data were analysed using one-way ANOVA and the Newman-Keuls test. $p<0.05$ was considered significant.

Results: Patient groups did not differ in age, weight, or length of surgery. Heart rate, systolic blood pressure, respiratory rate and arterial O_2 saturation did not change significantly in any of the groups during the study. There were no episodes of bradycardia, hypotension, bradypnea or apnea, airway obstruction or arterial O_2 desaturation either preoperatively or during recovery. No children were sedated to the extent that they failed to spontaneously respond to their environment or were unarousable. Six children experienced loss of balance and head control after administration of M. One of the six children complained of blurred vision postoperatively. Discharge from the PACU was not delayed by somnolence or impaired motor coordination.

Discussion: These results indicate that oral M 0.5-1.0 mg/kg is a safe premedicant for young children. In this dose range there were no cardiorespiratory side-effects. In view of the apparent loss of balance and head control that may occur we recommend that children be observed closely or held by their parents after premedication with M. Until a larger experience is available, observation by a nurse or physician with resuscitation equipment immediately available is recommended.

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References: 1. Anesthesiology 73: 841-834, 1990. 2. Eur J Clin Pharmac 37:267-272, 1989.

A922

TITLE: TRANSMUCOSAL MIDAZOLAM FOR PREINDUCTION OF ANESTHESIA IN PEDIATRIC PATIENTS: COMPARISON OF INTRANASAL AND SUBLINGUAL ROUTES

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Introduction: Intranasal sedatives[1,2] and narcotics[2,3] are effective for preinduction of pediatric patients, but 61-74% of children cry when drugs are administered via this route[2-3]. Oral transmucosal (OT) narcotic adminstration has been associated with pruritus, vomiting and hypoxemia[4]. This blinded, randomized study compares the acceptance and behavioral responses to midazolam (M) placed in the nose (IN) or under the tongue with (SLF) or without (SL) addition of flavoring.

Methods: After institutional approval and informed parental consent, patients aged 0.5 to 10 y scheduled for elective surgery were stratified by age and randomized to IN, SL, or SLF. Each was given 0.2 mg/kg M (5 mg/ml, 0.04 ml/kg) by an anesthesia-trained person not involved in behavior evaluation. All patients chose a candy flavor (Lorann) to scent the mask; for SLF patients the syringe tip was dipped in the same flavor, then coated with sugar. Duration of crying and compliance with instructions on drug administration were recorded. SpO_2 and behavior score[2] were recorded by 3 observers at 9 times: prior to administration, at 2.5 min intervals for 10 min, at separation, and during induction with increments of halothane in $70:30::N_2O:O_2$. Chest wall compliance and the occurrence of dysrhythmias and laryngospasm were recorded. Data were subjected to ANOVA, chi-square or weighted kappa analysis[5] as appropriate.

Results: A total of 93 patients were studied: 30 infants, 0.5-2y; 39 preschool, 2.1-5y; and 24 school age, 5.1-10y. Overall interobserver reliability was 0.8. OT administration appeared less unpleasant: of the children who were not crying before drug administration, 71% cried with IN application, 16% with SL ($p < 0.001$). Addition of flavor (SLF) did not significantly improve acceptance (13% began to cry). Nineteen percent of children spat out OT M (23% of SL, 16% of SLF), and 49% swallowed less than 20 seconds after OT administration (48% of SL, 50% of SLF). However, lack of compliance with instructions did not measurably alter drug effect. There was no difference between routes in the number of patients with inadequate drug effect (IN = 23%, OT = 19%). No patient was difficult to ventilate or had dysrhythmias; one had SpO_2 = 93%, one had laryngospasm.

Discussion: These results support previous documentation that transmucosal Midazolam is an effective preinduction sedative[2,3]. OT administration is as effective as and better accepted than IN. Addition of candy flavoring provided no measurable advantage.

	n	% Cry	% Inadequate
IN	31	71	23
SL	31	16*	26
SL + F	31	13*	13
Overall	93	33%	20%

* $p < 0.001$ vs IN

References: 1. Anesthesiology 69:972-975, 1988
2. Anesthesiology 71:A1169, 1989
3. Anesthesiology 68:671-675, 1988
4. Anesth and Analg 69:28-34, 1989
5. Biometrics 40:973-983, 1984