TITLE: ORAL MIDAZOLAM PREMEDICATION: OPTIMAL TIMING AND EFFECT OF ATROPINE

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Oral midazolam (MDZ) has been reported to be a safe and effective premedicant for children. The duration of sedation produced by oral MDZ and its effects when given alone or in combination with atropine (A) have not been studied. In this placebo-controlled, double-blind study, we evaluated the effects of timing and concomitant A administration on the action of oral MDZ.

106 parental-consented ASA I-II children, aged 1-8 yrs, undergoing brief outpatient procedures were randomly assigned to one of four treatment groups according to an IRB-approved protocol. Group I received apple juice 0.2 ml/kg; Group 2, A 0.02 mg/kg in apple juice; Group 3, MDZ 0.5 mg/kg with A 0.02 mg/kg in juice; Group 4, MDZ 0.5 mg/kg in juice. Cardiorespiratory variables (HR, RR, Sa02) and sedation level were determined at the time of premedication and at 15 minute intervals until the child entered the operating room. Separation [satisfactory = separates easily, non-clinging; unsatisfactory = crying, clinging, combative] and induction [satisfactory = unafraid, accepts mask; unsatisfactory = fear of mask, crying, combative] scales were used to evaluate the child's reaction to separation from parents and mask induction with halothane/N_2O. Data were analyzed using ANOVA and Chi-square tests, with $p<0.05$ considered significant.

No significant differences were found between treatment groups with regard to demographic data. MDZ produced no significant changes in HR, RR, or Sa02. MDZ (Groups 3 and 4) significantly improved the ease of induction (83% with satisfactory scores) compared to the non-MDZ groups (56%). MDZ also facilitated the separation process (89% vs 75% satisfactory separations). Children who were separated from their parents within 40 min had significantly better separation scores (table 1). There was no difference in the level of sedation, ease of separation/induction or the incidence of laryngospasm or bradycardia between patients who received A and those who did not.

In summary, the beneficial effects of oral midazolam, 0.5 mg/kg, decreased after 40 mins. Atropine, 0.02 mg/kg, appeared to have no significant effect when combined with midazolam.

Table 1. Effect of the time following premedication on the quality of separation, induction, and recovery

	Non-midazolam		Midazolam	
Separation	<40 min	>40 min	<40 min	>40 min
Satisfactory	81%	69%	95%**	71%*
Unsatisfactory	19%	31%	5%	29%
Induction				
Satisfactory	54%	58%	88%**	76%
Unsatisfactory	46%	42%	12%	24%
Recovery times				
Awakening (min)	9 ± 10		13 ± 12	
PACU stay (min)	29 ± 11		29 ± 18	
Postop agitation (%)	40		39	

* Significantly different from midazolam "<40 min" group, $p<0.05$
** Compared to non-midazolam "<40 min" group, $p<0.05$

Title: CEREBRAL HEMODYNAMICS DURING HYPOTHERMIC LOW FLOW BYPASS

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Introduction:

Cerebral ischemia is an important factor in neurologic dysfunction after cardiopulmonary bypass (CPB). In complex congenital heart surgery, low flow hypothermic bypass (LFHB) has been proposed to prevent the neurologic dysfunction that can occur after profound hypothermic circulatory arrest (PHCA). However, continuous presence and adequacy of cerebral blood flow (CBF) during LFHB has not been shown. The few studies of alterations in CBF during LFHB fail to include dynamic assessments of CBF.[1] Recently, LFHB has been questioned as to the adequacy of cerebral blood flow during bypass: is it a low flow or no flow period?[2] Using a transcranial doppler (TCD), we continuously measured the cerebral blood flow velocity (CBFV) of the middle cerebral and basal arteries before, during, and after LFHB.

Methods:

After institutional approval, we studied 12 infants undergoing repair of TGA using LFHB. Ages ranged from 1 to 60 days. Anesthetic management was identical in all patients with fentanyl, pancuronium, air/oxygen, and controlled ventilation. The cerebral blood flow velocity was measured using a TCD-2000, and a 2 MHz probe. Measurements of the MCA were made prebypass and normothermic, during CPB and hypothermic, and during LFHB. The mean arterial pressure, CVP, tympanic temperature, PaCO2 (alpha-stat), Hct, pH, glucose, and systemic flow (Q) was measured continuously while on bypass. The mean values of CBFV were compared using ANOVA. Data are expressed as means ± S.D. Signifcance was accepted as $p< 0.05$.

Results:

Patient mean age was 11 days and weight ranged between 3-4 kg. The neonates were cooled to tympanic temps of 18.3 ± 3.6°C at a flow of 1.5 L/min/m^2, then LFHB was begun at 0.5 L/min/m^2. The prebypass control CBFV was 26.2 ± 9.7 cm/sec. The CBV during CPB and cooling was 19.0 ± 7.2 cm/sec. During LFHB, the CBV was 6.4 ± 2.5 cm/sec. The CBFV values during LFHB were significantly different from both the control values and those during cooling on CPB.

Discussion:

With the TCD, we monitored CBFV continuously during LFHB. Cerebral blood flow was present continuously during LFHB but at very low velocities at the limit of detection by TCD. Presence of flow at low velocities was validated by demonstration of the relationship of pump head revolutions to oscillations in CBFV during low flow. TCD offers a means to evaluate CBF continuously during low flow bypass in various intracranial vessels. TCD can help determine whether low flow bypass provides adequate cerebral perfusion during deep hypothermia, and thus better cerebral protection than hypothermic circulatory arrest.

References:

[1] J Thorac Cardiovasc Surg 97:737-45, 1989

[2] J Thorac Cardiovasc Surg 98:193-9, 1989