Title: PREINDUCTION OF ANESTHESIA IN PEDIATRIC PATIENTS WITH NASALLY-ADMINISTERED SUFENTANIL

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Introduction. Induction of anesthesia in the pediatric patient presents a challenge to the anesthesiologist. Fear of painful or unpleasant procedures and separation from parents can result in a stormy induction, possibly resulting in lasting psychological effects.[1] Various techniques of premedication and induction have been tried, using oral,[2] intramuscular,[3] or rectal[4] routes of administration but each have disadvantages. We evaluated the use of nasally-administered sufentanil, 1.5-4.5 μg/kg, for preinduction (*i.e.*, premedication/induction) of anesthesia in pediatric patients.

Methods. Following approval by the local Committee on Human Research, informed consent was obtained to study 64 pediatric patients, ASA PS 1 or 2, scheduled for elective surgery requiring no special anesthetic technique. Patients were divided by age into two groups, young children (6-23 months, n = 24) and older children (2-8 years, n = 40). These unpremedicated patients were randomly assigned to receive sufentanil (1.5, 3.0, or 4.5 μg/kg) or normal saline (0.03 ml/kg) into one or both nares over a 15-20 s period. Attempts were made to separate the child from his/her parents at 4, 6, 8, and 10 min. Patients were taken to the operating room when cooperative or at 10 min if not cooperative. Induction of anesthesia was completed with 5% halothane and O_2 by facemask. Endotracheal intubation was performed and anesthesia maintained with 60-70% N_2O; halothane was added as clinically indicated. Ventilation was controlled to maintain a normal end-tidal PCO_2. Intraoperatively, no narcotics were given; muscle relaxants were used only if surgically indicated. At the end of surgery, N_2O and halothane were discontinued. The trachea was extubated when regular spontaneous ventilation occurred. The child was discharged from the recovery room by "usual criteria" and returned either home or to the ward as surgically indicated.

An observer, blinded to the dose, remained with the child until discharge from the recovery room and recorded the following:

Preinduction and induction: Oxygen saturation (S_aO_2) and heart rate using a pulse oximeter (Nellcor™); willingness to separate from parents, response to facemask, the anesthesiologist's assessment of compliance (chest and abdominal wall tone), response to intubation;

Maintenance: End-tidal halothane concentrations, $P_{et}CO_2$;

Emergence and Recovery: Skin-surface PCO_2 (SensorMedics™), S_aO_2, side effects, analgesic requirements;

Post-op Day 1: Parents were asked whether their child vomited, had pain, or change of appetite.

Data were analysed using χ^2 analysis or Fisher's exact test; $P < 0.05$ was considered statistically significant.

Results. Willing separation from parents at or before 10 min was more likely in subjects receiving sufentanil than in controls (table). Prior to induction of anesthesia, no patients vomited or desaturated ($S_aO_2 < 95\%$). Compliance decreased in many patients receiving sufentanil; the decrease in compliance increased with increasing doses of sufentanil. During induction, S_aO_2 fell below 95% in one subject (dose = 3.0 μg/kg); this resolved following succinylcholine (im) and oxygen under positive pressure. During intubation, patients that received sufentanil were less likely to move or cough. Intraoperatively, end-tidal halothane concentrations were lower in patients that received sufentanil. Two patients required naloxone for respiratory depression prior to extubation; both received sufentanil, 4.5 μg/kg. The incidence of vomiting in the PAR was similar for sufentanil and placebo groups. Crying in the PAR occurred less frequently and analgesics were required in fewer patients that received sufentanil. No patients experienced significant decreases in S_aO_2 while in the PAR. One day following surgery, there was no difference in pain or vomiting among the groups. However, patients that received sufentanil were more likely to have a normal appetite.

Table. Comparison of patients receiving placebo (normal saline) or sufentanil, 1.5-4.5 μg/kg, nasally. Data reported as incidence (number of patients/total) or as mean ± SD.

		Sufentanil (μg/kg)		
	Placebo	1.5	3.0	4.5
Willing to separate from parents at or before 10 min	5/12*	13/16	16/19	12/17
Accepts facemask	2/12	4/16	5/19	5/17
Respiratory compliance:				
Mildly decreased	0/12*	7/16	9/19	4/17
Markedly decreased	0/12*	0/16	1/19	4/17
Movement or coughing during intubation	6/12*	3/16	4/19	1/17
Maximum end-tidal halothane concentration	1.8 ± 0.6*	0.8 ± 0.4	0.8 ± 0.3	0.7 ± 0.4
$P_{skin}CO_2$ at extubation	45 ± 9*	50 ± 11	53 ± 10	54 ± 9
Vomiting in PAR (excludes patients with NG tubes)	5/12	3/16	2/17	9/17
Crying in PAR	11/12*	9/16	6/19	3/17
Analgesics in PAR	8/12*	5/16	2/19	1/17
Normal appetite 1 day following surgery	7/11*	12/15	17/18	13/16

* Different from sufentanil (all doses combined).

Discussion. The nasal administration of sufentanil to children as an adjunct for inducing anesthesia is a useful addition to the armamentarium of the anesthesiologist. Its administration is less traumatic than intramuscular injection and is more aesthetic than the rectal route, particularly in older children. Although not an induction agent at the doses studied, nasally-administered sufentanil provided a smoother separation from parents, better intubating conditions, and an overall more pleasant postoperative course.

References.

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