$ng \cdot ml^{-1}$). However, in order to avoid clinical hazards of excessive plasma concentration, even in patients where preoperative propranolol is well tolerated, we suggest a reduction in infusion dose of propranolol in cases with poorly documented or altered left ventricular function, prolonged infusion exceeding 24 h, and abnormal liver function.

We conclude that in patients with coronary artery disease receiving long-term propranolol therapy and unable to take the drug orally because of abdominal surgery, the postoperative maintenance of propranolol by a constant infusion offers the potential of preventing the withdrawal rebound syndrome phenomenon without harmful hemodynamic and ECG effects.

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Residents' Attitudes Toward Parents' Presence during Anesthesia Induction in Children: Does Experience Make a Difference?

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Allowing parents to be present with their children during induction of anesthesia may have advantages during this stressful phase of the surgical experience.[1–3] Potential advantages include minimizing the need for heavy premedication, avoiding screaming and struggling if the child refuses to leave his or her parents, and possibly decreasing postoperative anxiety. Since an established practice in our Department is to allow parents to be present during induction of anesthesia, and since none of the residents who come to our program have had such an exposure previously, we designed this study to examine two specific questions. First, what was the attitude of incoming anesthesiology residents toward our practice of having the parents present during anesthesia induction? Secondly, what changes, if any, occurred in the resident's attitude following a period of training where the parents actually are allowed to be present during induction of anesthesia?

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Received from the Department of Anesthesiology, Children's Hospital National Medical Center and George Washington University, Washington, D. C. 20010. Accepted for publication November 7, 1983.

Presented in part at the annual meeting of the American Society of Anesthesiologists, October 1983.

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Key words: Anesthesia, pediatric, outpatient; Education: residents.

METHODS

Twenty-two PGY III or IV anesthesia residents were told that most anesthesia inductions for elective surgery on healthy children over 18 months of age were performed in induction rooms and that parent(s) remained present until the child was asleep. Our induction rooms are equipped to allow the resident to choose any method of induction, and an attending anesthesiologist is present at all times. During orientation, the residents were shown a slide/tape presentation describing the actual procedure. They then were asked to respond to a written questionnaire, consisting of questions and statements designed to determine the resident's acceptance of or concerns about the parents presence during induction of anesthesia. Each question or statement had to be considered separately. First the residents had to decide whether they generally agreed or disagreed with the statement. Then they had to indicate the degree of agreement or disagreement (slightly, moderately, or strongly). The questions addressed four major areas of possible concern. First, is it acceptable to allow the parents to be present during anesthesia induction in preschool children? Secondly, are there real advantages to parents and children in so doing? Thirdly, does the parent's presence increase the resident's anxiety during anesthesia induction? Fourth, are the resident's concerns, if any, related to 1) safety of the child; 2) parents' anxiety; 3) limiting teaching opportunity during induction; or 4) fear of litigation?

After 8 weeks of performing anesthesia inductions with the parents present, the residents were asked to complete the same questionnaire again (thus acting as their own controls). Changes in their responses were noted and compared using a paired t test.

RESULTS

The number of residents who agreed or disagreed to the grouped statements is shown in table 1, expressed as a percentage of the total who responded (N). The strength of agreement or disagreement is shown as a continuous scale of 6 to 1 (6 = strongly agree, and 1 = strongly disagree). The responses are presented "Before" and "After" the 8-week training period.

Eighty-six per cent of the residents immediately agreed that it was acceptable to have parents present during anesthesia induction. The number increased to 96% with experience, with a clear shift towards a stronger agreement. The change in the mean response from 5.00 before to 5.5 after training is statistically significant.

To the question of whether there are real advantages to children and parents in having parents present during induction, 90% agreed before, and 100% agreed after experience. However, the change in the strength of agreement statistically was not significant.

There was some apprehension. However, the response to the statement that parents presence during induction may make the anesthesiologist uncomfortable showed the anxiety level to decrease significantly (but not resolve completely) with experience.

Of the possible reasons for concern, the fear for the possible compromised safety of the child was high on the list. That did not change significantly with training. Next came the concern that "parents usually are too anxious and that their presence would make induction more difficult because this anxiety might be transmitted to the child." Again, that did not change significantly with experience. From the educator's standpoint, the resident's concern that parents presence would detract from their training experience, possibly because it would force attendings to play a more active role, was not widespread before and decreased significantly with experience.

DISCUSSION

Shulman *et al.*[3] stated that there are three general questions involved in the issue of allowing parents to be present during anesthesia induction in children. First, how are children influenced by the presence of their parents? Second, do parents become upset, critical, interfering, or anxiety provoking if they are present? Third, do physicians performing the procedure feel uncomfortable if parents are present?

In addressing the first two questions, Shulman *et al.*[3] concluded that children who were accompanied by parents during induction of anesthesia were less upset. Parents were enthusiastic and not objectionable or upsetting. Similar results recently have been reported by our group in an outpatient setting.[1] In the present study, only the issues involving physician's response were addressed.

The number of residents who immediately agreed to the desirability of having the parents present during anesthesia induction in preschool children was high. This acceptance may be the result of the availability of fully equipped induction rooms, and the knowledge that a member of the attending staff would be present and helping with the procedure. The number favoring parents' presence increased even more with experience ($P < 0.05$). As expected, residents expressed a certain level of anxiety about the parents' presence; however, this anxiety and concern decreased significantly with training ($P < 0.05$). Of the possible reasons for concern, the fear of parents being critical if they observe something go wrong and the fear for possibly compromising the safety of the child were most cited. These fears did not subside significantly with experience. Residents remarked from experience that the necessity of induction rooms to accommodate the parents was more inconvenient and necessitated more set-up time than induction in the operating room. The fear that their training experience would be hampered

TABLE 1. Residents' Responses before and after Training†

1) It is acceptable to have the parents present during anesthesia.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	22	36%	41%	9%	14%	0%	0%	5.00
After	22	64%	27%	5%	4%	0%	0%	5.50*

2) There are real advantages to children and parents in having parents present during induction.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	22	36%	45%	9%	7%	3%	0%	5.04
After	21	53%	40%	7%	0%	0%	0%	5.46

3) Parents presence during induction may make the anesthesiologist uncomfortable (increased anxiety).

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	21	0%	10%	14%	33%	38%	5%	2.86
After	22	0%	4%	5%	14%	45%	32%	2.04*

4) My major reservations about allowing parents to be present during anesthesia inductions are:

a) It may compromise the safety of the child.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	22	0%	5%	32%	18%	36%	9%	2.88
After	22	0%	5%	36%	9%	23%	27%	2.69

b) Parents usually are too anxious, and their presence would make induction more difficult because the anxiety might be transmitted to their child.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	22	0%	4%	5%	50%	27%	14%	2.58
After	22	4%	5%	9%	18%	41%	23%	2.44

c) The parents' presence detracts from the resident's training experience.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	22	4%	9%	5%	23%	41%	18%	2.58
After	22	0%	0%	4%	9%	32%	55%	1.62*

d) Should something go wrong in the parents' presence, the likelihood of litigation is increased.

		AGREE			DISAGREE			
	N	6	5	4	3	2	1	Mean
Before	21	19%	10%	29%	24%	14%	4%	3.84
After	22	0%	14%	32%	27%	23%	4%	3.29

* $P < 0.05$.

† See text for details.

by having parents watch during induction, possibly because it would force attendings to play a more active role, was not widespread and it decreased significantly ($P < 0.05$) with actual exposure.

It must be acknowledged, however, that in a study of this kind the possibility of bias always exists. The number of residents is relatively small, but among them they administered over 3,000 anesthetics. Many of these residents

never have been exposed to induction of anesthesia in children without parents. Moreover, since our institution's policy is to allow parents to be present during anesthesia induction, the residents are not in an atmosphere in which they objectively can evaluate whether having the parents present represents a disadvantage with faculty, who have practiced in this manner for several years, present.

We conclude that under the conditions of the study, resident anesthesiologists came to accept the concept of parent's presence during anesthesia induction. The moderate degree of anxiety expressed decreased significantly with experience. Although there was an extra measure of inconvenience, the residents indicated that such an arrangement did not interfere with their training experience.

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60:601–603, 1984

Malignant Hyperthermia and Glucose-6-phosphate Dehydrogenase Deficiency

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The diagnosis of malignant hyperthermia (MH) may be suspected prior to anesthesia only if the patient has had a previous episode, is a member of a family identified as being susceptible to MH,[1–4] or has known associated neuromyopathy.[5–8] Consequently, both sporadic cases as well as unrecognized MH susceptible patients who have survived previous anesthesia without any manifestations of MH may escape notice.[9–12] We therefore report the following case as an alert to its broad spectrum of presentation.

Report of a Case

A 22-month-old, 12-kg male child with known glucose-6-phosphate dehydrogenase (G6PD) deficiency was admitted for a staged hypospadias repair. His red blood cell enzyme deficiency was diagnosed at birth by the maleimide–NAPD screening test. His growth and developmental milestones had been normal, and he had suffered no hemolytic crises. Physical examination was entirely normal except for the presence of his known urologic defect. Laboratory studies also were unremarkable, and there was no evidence of active hemolysis. He had had no prior surgeries. Moreover, his mother, father, a male sibling, and maternal grandmother had all received general anesthesia without recognized complications.

After administration of meperidine 14 mg, promethazine 14 mg, and scopolamine 0.15 mg im, arterial blood pressure was 90/50 mmHg, respiratory rate 20 · min^{-1}, heart rate 110 beats/min and skin temperature 35.9° C. An inhalation induction was initiated by means of a Bain circuit delivering a mixture of N_2O, O_2, and halothane at a fresh gas flow of 2.4 l · min^{-1}. Upper airway obstruction resulted, which was not relieved by insertion of an oropharyngeal airway. After an adequate level of anesthesia had been achieved, an iv infusion was instituted, the vocal cords exposed and subsequently sprayed with 0.5 ml 4% lidocaine. Immediate laryngospasm resulted, which did not respond to gentle continuous positive pressure with a $F_{I_{O_2}}$ of 1.0. Succinylcholine 25 mg was given iv and the laryngospasm resolved. However, severe trismus then developed. The diagnosis of MH susceptibility was considered likely. Anesthesia was discontinued, and the Bain circuit and machine were exchanged for uncontaminated equipment. Ventilation was controlled with an $F_{I_{O_2}}$ of 1.0 until the patient was fully awake. Rectal temperature did not increase. Analysis of peripheral venous and arterial blood gases and blood creatine phosphokinase (CPK) concentrations were determined (table 1). The patient was monitored in the recovery room for 6 h without changes in vital signs and then transferred to an intensive care unit for overnight observation. Ten hours after induction of anesthesia, while resting in his mother's arms, he had a sudden increase in heart rate, respiratory rate, and a slight increase in rectal temperature (table 1). While in transport to the recovery room, dantrolene sodium was given, 3 mg/kg, iv. The trachea then was intubated and the patient sedated. Both an arterial line as well as Foley catheter were inserted. Urine output was maintained at 3 ml · kg^{-1} · hr^{-1} with administration of crystalloids iv. Dantrolene sodium, 1 mg/kg, was given iv every 4 h.

Twice during the next 24 h, resting heart rate and respiratory rate increased prior to the next scheduled dose of dantrolene. When this occurred, additional dantrolene, 2 mg/kg iv was given. After 12 h, the CPK values decreased slowly, the metabolic acidosis corrected, and vital signs remained stable. No free hemoglobin or myoglobin was found in the serum or urine. The trachea was extubated the next morning. He received a tapering oral dantrolene sodium regimen for 48 h. His reticulocyte count remained normal, and repeated peripheral blood smears showed no evidence of Heinz body formation. His subsequent recovery was rapid and uneventful. He and his family then

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Received from the Department of Anesthesiology, Medical College of Georgia, Augusta, Georgia 30912. Accepted for publication November 9, 1983.

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Key words: Neuromuscular relaxants: dantrolene; Hyperthermia: malignant; Genetic factors: glucose-6-phosphate dehydrogenase deficiency.