

Chloral hydrate and other drugs used in sedating young children: a survey of American Academy of Pedodontics Diplomates

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Abstract

A survey of 325 American Board of Pedodontics Diplomates was conducted to determine the use of chloral hydrate and other sedative medications in treating young, uncooperative children needing extensive operative procedures. Seventy-one per cent of the respondents returned usable surveys. Seventy-eight per cent of the Diplomates indicated they use sedative agents for these patients. However, the results of the survey show a lack of consensus among pedodontists regarding the selection and dosage of sedative drugs.

In recent years, faculty and dental residents in the Advanced Training Program in Pedodontics of Marquette University and Milwaukee Children's Hospital have been successfully treating young, uncooperative children needing extensive operative procedures. Chloral hydrate, alone or as a comedication with other drugs, has been used as a hypnotic sedative.

Before starting a clinical research project on the procedure, the authors wanted more information on the use of sedatives in current pedodontic practices. A survey of American Board of Pedodontics Diplomates was conducted to determine the extent of chloral hydrate use in pediatric dentistry, comedications commonly used with chloral hydrate, and other medications used for sedating these children.

Literature Review

A review of the literature shows three major categories of sedative agents plus nitrous oxide/oxygen.

Hypnotics or Sedative Hypnotics

This category produces sedative effects, allaying anxiety through depression of the sensory cortex. Medications commonly used in this category include chloral hydrate and the short-acting barbiturates, secobarbital, and pentobarbital. Sim¹ stated that chloral hydrate is reasonably fast acting, has a high safety factor, and few

side effects. It can be used alone or as a comedication agent. Recommended dosage is 50 mg/kg but no more than two grams in one dose. Chloral hydrate generally is recommended over the barbiturates because of its relative safety; it does not have the same potential for respiratory depression with hypnotic doses.

Various degrees of success with chloral hydrate have been reported. Anderson², using empirical methods, reported excellent results in 280 children. In his study, patients selected were unmanageable or needed extensive restorative work.

More recently, Smith³ compared the effectiveness of chloral hydrate to a placebo in handicapped children. He found no significant improvement in behavior using a dosage nomogram of 500-1,500 mg depending on body weight. His youngest patient was four years, three months of age. Barr⁴ and coworkers found no significant improvement in behavior with a chloral hydrate dosage schedule of 40 mg/kg.

Tobias and coworkers⁵ reported the effectiveness of chloral hydrate in combination with hydroxyzine pamoate on 39 children aged 1.75-10.5 years of age with a mean age of 3.9 years. The dosage schedule was either 1,000 mg or 1,500 mg of chloral hydrate given one hour preoperatively and 50 mg of hydroxyzine pamoate given the evening before, one hour preoperatively and in selected cases between the time the child awakened and one hour before the appointment. The average dosage of chloral hydrate was 75 mg/kg with a range of 36-130 mg/kg. This dosage schedule is higher than those used in the other studies and would be expected to produce more of a hypnotic than a sedative effect in patients. King and Berlocher⁶ recommended a dosage of 750-1,250 mg of chloral hydrate for the patient between 24 and 25 pounds.

Harris⁷ stated that the barbiturates sedate quickly, have a high frequency of success, and a low frequency of side effects. Dudley⁸ recommended oral dosages of 1.5-2.0 mg/lb of pentobarbital and suggested that dentists often prescribe insufficient dosage.

Anti-anxiety or Psycho sedation Agents

This group of drugs produces a calming or quiescent effect without loss of consciousness. Hydroxyzine, in the form of Atarax^a or Vistaril^b is a popular medication in this category. In addition to being sedative, the drug is antihistaminic, antispasmodic, antiemetic, and slightly anticholinergic. Wright and McAulay⁹, in a 1973 survey of 812 pedodontists, reported that when a single drug was selected for sedation, hydroxyzine was used most often. Kopel¹⁰ reported its use as a sole premedicating agent and recommended administration of divided doses. He also suggested its use in comedication with meperidine, chloral hydrate, and nitrous oxide/oxygen psycho sedation.

Diazepam (Valium)^c is another popular sedative agent in the anti-anxiety group. It affects the limbic system, altering the experience and transmission of emotions.⁶ Most people receiving diazepam experience an amnesic effect.¹¹ Hargreaves¹² recommended oral administration and divided doses.

Promethazine (Phenargan),^d commonly prescribed for its antihistaminic properties, also produces a state of quiescence. Musselman and McClure¹³ stated that used alone it is not very effective as a sedating agent, but that it can be used for a child who demonstrates minor apprehension. However, it generally is used as a comedication with other drugs. Robbins¹⁴ used promethazine in comedication with chloral hydrate and found less frequent stomach upset than with chloral hydrate alone. Promethazine commonly is used in comedication with meperidine because of its additive sedative effect and to control nausea.^{15,16}

Synthetic Narcotic Analgesics

This third major group of premedication agents reduces acute pain, decreases apprehension and provides a sedative effect. The sedative action of the drugs is a result of effects on the cerebrum. However, they also affect the medulla and can cause severe respiratory depression.

A national survey of American Society of Dentistry for Children members in 1980 found that the most common method of sedating children in dentistry was with narcotic sedation.¹⁷ The narcotic agents most commonly used were meperidine (Demerol)^e and alphaprodine HCl (Nisentil).^f Wright and McAulay⁹ reported that 35% of pedodontists surveyed used meperidine and promethazine as comedications.

Musselman and McClure¹³ recommended meperidine for children younger than eight years of age who exhibited overt disruptive behavior. Myers and Shoaf¹⁸

reported excellent results using meperidine in combination with promethazine and chlorpromazine, an anti-anxiety agent. Most of their subjects were three years of age or younger. They used intramuscular administration.

Alphaprodine HCl is pharmacologically similar to morphine and meperidine except that onset is rapid and the duration of action is short. It usually is used as a comedication, most often with promethazine.¹⁷ Alphaprodine HCl usually is administered via submucosal injection. The literature recently has recommended against intramuscular injection because absorption is too unpredictable.¹⁹ Recent literature also stresses safety precautions with the use of alphaprodine HCl.^{13,19-22} Recommendations include continuous oxygen administration, coadministration of an antagonist, mechanical monitoring of blood pressure and heart rate, and precordial stethoscope monitoring.

Methods and Materials

American Academy of Pedodontics Diplomates were chosen as the survey population. This decision was based on a survey in 1980 from which it was concluded that future studies of pedodontic procedures in use could be determined by polling the Diplomates (thus having an economical and valid alternative to conducting a survey of more than 1,700 Academy members).²³

The survey was conducted in October, 1981. Of the 325 questionnaires sent, 237 (73%) of the Diplomates responded with 168 (71%) of the responses usable.

The objectives of the survey were to determine:

1. How many pedodontists used sedative agents to treat young, uncooperative patients needing extensive work
2. How many pedodontists used chloral hydrate alone or in combination to treat this group of patients
3. What dosages of chloral hydrate and other drugs (if used in comedications) were being administered
4. What other sedatives were being used alone or as comedications and their dosages.

Results

Most of the Diplomates (75%) responded that they use sedative agents for young children needing extensive operative procedures; 22% responded that they do not use sedation. A few respondents stated that if the child could not be managed with traditional (nonpharmacological) techniques, general anesthesia in a hospital was their alternative means of management.

Chloral hydrate is used alone or as a comedication by 62% of the Diplomates sedating young children. It should be noted that this does not mean they use it exclusively. Several respondents who indicated they use chloral hydrate alone or as part of a comedication also listed other sedative agents in response to a further question concerning the use of other drugs.

The responses were quite diverse in choice of drug and

^aRoerig, a Division of Pfizer Pharmaceuticals; New York, N.Y.

^bPfizer Laboratories Division, Pfizer, Inc.; New York, N.Y.

^cRoche Laboratories; Nutley, N.J.

^dWyeth Laboratories; Philadelphia, Pa.

^eWinthrop Laboratories; New York, N.Y.

^fRoche Laboratories; Nutley, N.J.

Table 1. Respondents Using Chloral Hydrate Alone

<i>Chloral Hydrate</i>		<i>R*</i>
Dose	Route of Administration	
5-15 mg/kg	Oral	6
50-100 mg/kg	Oral	3
250-1,000 mg	Oral	8
750-2,000 mg	Oral	4
Total		21

*Number of responding Diplomates.

dosage used (Tables 1-6). In order to make the tables more understandable, similar doses were grouped and listed as a range. Tables 1 and 2 were divided into two sections to accommodate dosages given by body weight and straight milligram doses.

About 19% of the Diplomates using chloral hydrate indicated they use it alone. The drug was administered orally in dosages of 5-100 mg/kg or doses of 250-2,000 mg (Table 1).

Approximately 52% of the Diplomates using chloral hydrate use it as a comedication with hydroxyzine (Vistaril or Atarax). Chloral hydrate is administered in

Ninety-four (52%) of the Diplomates who premedicate children reported its use alone or as a comedication with other drugs (Table 5).

Twenty-six (28%) of the Diplomates using meperidine stated they use it alone. Half of these administered a dosage of 1 mg/kg intramuscularly or subcutaneously. The other half administered a straight 10-75 mg dose. Forty Diplomates (43%) use meperidine with promethazine. Doses of meperidine ranged from 15 to 50 mg and doses of promethazine from 6 to 20 mg. Slightly more than half (23) used an oral route of administration as opposed to an intramuscular or subcutaneous route (17). Twenty-eight (30%) of the Diplomates use meperidine as a comedication with other drugs.

Several other drugs are used widely, especially hydroxyzine, diazepam, and nitrous oxide/oxygen, all used alone (Table 6, page 256). Seven diplomates reported that they currently use alphaprodine HCl and six provided the unsolicited information that they formerly used it, but discontinued use when it was taken off the market in September, 1980.

Discussion and Conclusion

The 1980 ASDC survey results published by Aubuchon¹⁷ reported that the most common method of

	<i>Chloral Hydrate</i>		<i>Hydroxyzine</i>		<i>R*</i>
	Dose	Route of Administration	Dose	Route of Administration	
Table 2. Respondents Using Chloral Hydrate + Hydroxyzine	5-25 mg/kg	Oral	0.25-1 mg/kg	Oral	11
	25-60 mg/kg	Oral	0.5-1 mg/kg	Oral	10
	250-750 mg	Oral	10-30 mg	Oral	6
	500-1,500 mg	Oral	10-75 mg	Oral	26
	Doses not given				6
Total					59

*Number of responding Diplomates.

dosages of 5-60 mg/kg or doses of 250-1,500 mg. Hydroxyzine is given in dosages of 0.25-1 mg/kg or doses of 10-75 mg/kg (Table 2). The most popular dose (24 Diplomates) is 500-1,500 mg of chloral hydrate and 10-75 mg of hydroxyzine.

About 10% of the Diplomates using chloral hydrate indicated they use it as a comedication with nitrous oxide/oxygen. Doses ranged from 500-1,200 mg of chloral hydrate with 20-70% nitrous oxide/oxygen (Table 3).

Nineteen per cent of the Diplomates using chloral hydrate use it as a comedication with drugs other than hydroxyzine and nitrous oxide/oxygen (Table 4). Six Diplomates use oral combinations of chloral hydrate and promethazine (Phenergan). Three use chloral hydrate with meperidine (Demerol). Four use a combination of chloral hydrate, hydroxyzine, and promethazine.

The second most popular drug reported for premedicating young patients was meperidine (Demerol).

sedating children in dentistry was by narcotic sedatives. The results of the current survey show an almost even split between the hypnotics (chloral hydrate) and the narcotics. Three respondents indicated they use chloral hydrate and meperidine as comedications and these were included in Table 1. If we include these in the meperidine group and add the narcotics together, even including the "formerly used Nisentil" group, the total is 114. The

Table 3. Respondents Using Chloral Hydrate + Nitrous Oxide

<i>Chloral Hydrate</i>		<i>Nitrous Oxide & Oxygen</i>		<i>R*</i>
Dose	Route of Administration	Dose	Route of Administration	
500-1,200 mg	Oral	20-70% N ₂ O	Inhalation	
Total				11

*Number of responding Diplomates.

	<i>Chloral Hydrate</i>		<i>Comedication</i>		<i>Additional Comedication</i>		<i>R*</i>	
	Dose	Route of Administration	Dose	Route of Administration	Dose	Route of Administration		
Table 4. Respondents Using Other Chloral Hydrate Comedications	500-2,000 mg	Oral	Promethazine 10-25 mg	Oral	—	—	7	
	500-1,000 mg	Oral	Meperidine 5-15 mg	Oral	—	—	3	
	500-1,500 mg	Oral	Hydroxyzine 25-50 mg	Oral	Promethazine 12.5-50 mg	Oral	4	
	500-1,000 mg	Oral	Hydroxyzine 25-75 mg	Oral	N ₂ O 20-50%	Inhalation	2	
	Other Combinations							6
	Total							22

*Number of responding Diplomates

chloral hydrate users total 113. The current survey specified "young" patient and there was no reference to age mentioned in the ASDC survey; this may or may not have affected the results.

In 1973 Wright and McAulay found the most popular sedative drug used alone was hydroxyzine (Atarax or Vistaril) followed by chloral hydrate.⁹ The current survey found 26 Diplomates using meperidine alone, 25 using hydroxyzine alone, and 21 using chloral hydrate alone.

The most frequently used comedication found by Wright and McAulay was meperidine and promethazine. The present survey found 59 Diplomates using chloral hydrate and hydroxyzine and 40 using meperidine and promethazine.

In conclusion, the results of the survey indicate a continued lack of consensus among pedodontists regarding the selection and dosage of drugs used for sedation. More research in this area is needed before an attempt can be made to formulate a consistent set of treatment guidelines.

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Table 5. Respondents Using Meperidine Alone or in Comedication

<i>Meperidine</i>		<i>Comedication</i>		<i>Additional Comedication</i>		<i>R*</i>	
Dose	Route of Administration	Dose	Route of Administration	Dose	Route of Administration		
1 mg/kg	IM or Sub Q**	—	—	—	—	13	
10-75 mg	IM or Sub Q	—	—	—	—	13	
25-50 mg	IM or Sub Q	Promethazine 6-20 mg	IM or Sub Q	—	—	17	
15-50 mg	Oral	Promethazine 6-25 mg	Oral	—	—	23	
15-50 mg	Oral	Hydroxyzine 20-50 mg	Oral	—	—	7	
0.5 mg/kg	IM	Hydroxyzine 0.5 mg/kg	IM	—	—	2	
0.5 mg/kg	IM	Promethazine 0.25 mg/kg	IM	Thorazine 0.25 mg/kg	IM	8	
25-100 mg	Sub Q	Promethazine 25-50 mg	Oral	Hydroxyzine 25-50 mg	Oral	3	
Other combinations							8
Total							94

*Number of responding Diplomates.

**Intramuscularly or subcutaneously.

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Table 6. Other Premedications

Medication		Comedication		R*
Dose	Route of Administration	Dose	Route of Administration	
Hydroxyzine 50-150 mg	Oral	—	—	25
Diazepam 2.5-10 mg	Oral	—	—	18
Nitrous oxide 30-50%	Inhalation	—	—	16
Promethazine 0.5 mg/kg	Oral	—	—	9
Promethazine 15-25 mg	Oral	Alphaprodine 0.6 mg	Sub Q**	4
Alphaprodine HCl 0.4-1.2 mg/kg	Sub Q	—	—	7
Formerly used alphaprodine HCl	—	—	—	6
Other combinations	—	—	—	7
Total				92

*Number of responding Diplomates.

**Subcutaneously.

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