ABSTRACT

Probably the greatest single problem in offering and performing adequate dentistry for child is that of physical control of patient. A fearful child cannot be a cooperative patient. Pharmacological management of the pediatric dental patient is considered a subcategory of behavior management techniques. Pharmacological techniques are not universally offered by practicing dentists for a host of reasons including variation in practitioner training, philosophy state rules and regulations and also safety issues. This article discusses various issues related to utilization of premedication in pediatric dentistry.

Keywords: Pediatric, Premedication, Pharmacologic, Drugs, Safety, Antibiotics.


Source of support: Nil

INTRODUCTION

Preoperative anxiety is a common occurrence with its incidence of almost 60% as far as pediatric patients are concerned. Children may become overly uncooperative at the time of separation from parents or anesthesia application. Untreated anxiety can lead to difficult induction, increased postoperative pain, greater anesthetic requirements, emergence agitation and even postoperative psychological effects and behavioral issues. Despite the many advances in nonpharmacologic interventions, practitioners still rely on sedative premedicants especially in case of uncooperative patients. The goals of premedication in children's dentistry are to relieve excessive apprehensions and to prevent resistance to treatment efforts. With judicious use, premedicating agents are a necessary adjunct for the pediatrician. When integrated with proper psychological approaches, premedication may enable the anxious child to accept his dental experiences without undue emotional turmoil or it may often allow outpatient treatment of very young 'pre-cooperative' children where the only alternative might be hospitalization and general anesthesia.

Advantages and Disadvantages of Premedication

Wright and other researchers conducted surveys that have indicated that approximately 85% use behavior modifying drugs with some frequency, and that about 15% never do. Garfin, Olsen, MacGregor and Chambers in their researches presented opinions which suggested that there are instances when a dentist has to resort to premedicating children to obtain their cooperation. Garfin inferred that the routine use of sedatives and tranquilizers may reflect impeded care and treatment of child while Olsen concluded that dentists resort to premedication to ease their treatment. Instead, the child is introduced to an unhealthy method of coping with a difficult situation in much the same manner that a drug addict or alcoholic learns to react. He also inferred that physical restraint is preferred to premedication as it had potentially less damaging consequences to the child. However, Fisher concluded that any use of force by the dentist as an approach should always be contraindicated.

There are a number of authors who are proponents of routine premedication for children. Stewart concluded that this approach is justified and necessary because in children experiencing perhaps their first dental visit, apprehension may be acute and damaging. He also stated that emotional stress on the operator will be reduced.

Premedication Agents

Most authors are of the opinion that inappropriate behavior on the part of the child patient is due to anxiety. Use of premedication in management of anxiety is reflected by the many different drugs or combinations of drugs which have been proposed by various authors. In general though, most commonly used agents may be grouped within the broad pharmaceutical categories of hypnotics, anti-anxiety agents and narcotics.

The hypnotic class of drugs, when used in appropriate dosages, produces sedative effects through a depressant action on the sensory cortex. For example, chloral hydrate and the short acting barbiturates, seconal and pentobarbital...
barbital are employed quite often for premedication in dentistry. Harris concluded that the barbiturates are useful as they sedate quickly with a high frequency of success and a very low frequency of undesirable effects. Anderson found chloral hydrate to be an effective and safe premedicant when used in larger dosages. Dudley inferred pentobarbitol offered many advantages as a premedicant for children but added that too often dentists invite failure by prescribing an insufficient dosage. For an oral dose, it is suggested that 1.5 to 2.0 mg/lb be administered 1 hour before the appointment. In the case of an extremely excitable child, the usual 2.0 mg/lb limit may be safely increased since there is an extremely wide margin of safety with pentobarbitol. He also concluded that the paradoxical excitatory effect seen infrequently with barbiturates is of little consequence and not a valid excuse to avoid using these drugs. When this untoward reaction does occur, it usually happens shortly after administration and gives way to normal sedative action by appointment time.

The anti-anxiety drugs act as effective psychotherapeutic agents in dentistry, but their usefulness has not been evaluated as extensively as the hypnotics and narcotics. Most are relatively new drugs which are said to produce ‘psychic sedation’ or ‘quietsness,’ but their pharmacodynamics are still obscure. Of the many agents in this category, two have emerged as popular choices for premedication purposes. They are hydroxyzine as either the hydrochloride (Atarax), or pamoic salt suspension (Vistaril), and diazepam (Valium). Stewart investigated the effects of hydroxyzine clinically and concluded that it reduced preoperative anxiety by producing a state of subdued emotional responses without the loss of mental alertness. As initial dosages, he suggested 10 mg for children under four and 20 mg for those four and older, to be given 45 minutes prior to the appointment. Diazepam (Valium) seems to offer promise in the pharmacotherapeutic approach to behavior management. The action of diazepam affects the limbic system, altering the experience and transmission of emotions. This results in the reduction of tension and production of a certain amount of amnesia. Promethazine, although not classified as an antianxiety drug, has been characterized as producing a state of quiescence with little or no sign of respiratory or cardiovascular depression. Dudley emphasized that for maximum effectiveness, tranquilizing drugs should be taken for at least 1 or 2 days prior to a dental appointment.

Midazolam is a newer generation of benzodiazepine class which is short-acting water soluble CNS depressant. The drug is used for treatment of acute seizures, moderate to severe insomnia, and for inducing sedation and amnesia before medical procedures. It possesses profoundly potent anxiolytic, anterograde, amnestic, hypnotic, anticonvulsant, skeletal muscle relaxant, and sedative properties. The anterograde amnesia property of midazolam is useful for premedication before surgery to inhibit unpleasant memories. The administration of midazolam via parenteral route is well documented. Although iv route is most effective, it is not preferred in children. Parenteral administration is the major cause of anxiety, discomfort and trauma in children and the trend in pediatrics is to avoid injections whenever possible. Consequently other routes including oral, rectal and nasal routes have been used. The doses of the different routes are 0.5-0.75, 0.4-1.0 and 0.2-0.3 mg/kg respectively. The recommended dose of midazolam is dependent on nature of procedure. Midazolam has a fast recovery time and is the most commonly used benzodiazepine as a premedication for sedation. Midazolam, like many other benzodiazepines, has a rapid onset of action, high effectiveness, and low toxicity level. Midazolam is free of any side effects. It offers many advantages when compared with diazepam. Drawbacks of midazolam include hypoventilation and associated hypoxemia. Paradoxical effects occasionally occur, most commonly in children and the elderly, particularly after intravenous administration. So it is advisable to monitor the children who are receiving midazolam and dose regime should be strictly followed. It is on the WHO Model List of Essential Medicines, the most important medications needed in a basic health system.

The opioids has been employed in dentistry for premedicating purposes, but recently the newer synthetic narcotics seem to offer advantages which make them better choices. Opioids allay anxiety and apprehension of operation, produce pre and post operative analgesia, smoothen induction, reduce the dose of anesthetic required and reduce postoperative restlessness. Meperidine (Demerol) and alphaprodine (Nisentil) has been mentioned most often as useful and effective narcotics for premedication. It is for this reason that the nonnarcotic analgesics, such as propoxyphene and ethophetazine citrate have little or no application in behavior management problems. Pentazocine [Fortwin (Lactate injectable form) and Talacen (with acetaminophen)] is a synthetically-prepared prototypical mixed agonist–antagonist narcotic (opioid analgesic) drug of the benzomorphan class of opioids used to treat moderate to moderately severe pain. Different premedicating agents are summarized in Table 1.

**Risks and Safety Associated with Premedication**

Many risks are involved with child sedation for dental procedures. Brain damage and death are the most dramatic and paralyzing outcomes for the patient, family,
caused primarily by respiratory and airway compromise in sedated children. Depending on the child’s behavior, especially when disruptive and crying behaviors dominate, the airway examination can be misleading. Minor risks include vomiting, irrational and paradoxical behaviors, and extremes in physiological parameters (e.g., sustained high heart rate in a lightly sedated toddler).

To optimize favorable sedation outcomes, only healthy children or those with very minor conditions (e.g., mild cerebral palsy) should be sedated. Therefore, in addition to an airway examination, parents must be queried about the occurrence, frequency, and degree of snoring.

Any child especially those who are unhealthy can be at significant risk for a sedative procedure. It is imperative that the child’s health history be reviewed critically and a physical examination completed, including examination of the airway.

Other issues such as allergies, respiratory and cardiovascular risk factors, impaired metabolic and organ functions and the psychosocial makeup of the child are always important to address and understand.

The mouth is a part of the airway, and when it is being challenged by dental procedural steps, the airway is also challenged. If the patient’s ability to control the airway is impaired due to pharmacological override of routine airway reflexes (e.g., swallowing), failure to compensate or protect those reflexes can result in more primitive reflexes such as laryngospasm. An unresolved and poorly managed laryngospasm can result in significant cerebral complications that can be life-threatening. Preventive and protective formats such as rubber dams are certainly indicated, especially in sedated patients. Nonetheless, rubber dams in children evoke feelings of suffocation. They can also aggravate a situation in which patients already feel their ability to mediate any sense of control of their environment is minimized.

Morbidity and mortality statistics related to sedation are difficult to obtain and put into a reasonable safety perspective. There is no doubt that sedation deaths involving children have occurred but there is no evidence suggesting that any sedation death has occurred when the practitioners faithfully followed appropriate sedation guidelines and were within the limits of professional parameters of care. Guidelines for various premedicating agents are summarized in Table 2.

### Antibiotic Premedication

Antibiotics are not an alternative to dental intervention; they are adjunct and are rarely used as premedicants. Antibiotics are indicated when clinical signs of involvement are evident. Antibiotics are indicated in dental practice for treating immunocompromised patients, evident signs of systemic infection and if the signs and symptoms of infection progress rapidly.

### CONCLUSION

Pharmacological management of pediatric dental patients is an acceptable and desirable technique. There

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**Table 1: Summary of different premedicating agents**

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Type</th>
<th>Effect</th>
<th>Action</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hypnotics</td>
<td>Sedative effect</td>
<td>Causes depression of sensory cortex</td>
<td>Chloral hydrate</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Secobarbital</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Pentobarbital</td>
</tr>
<tr>
<td>2</td>
<td>Antianxiety</td>
<td>Psychotherapeutic effect</td>
<td>Effects limbic system</td>
<td>Atarax</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Vistaril</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Diazepam</td>
</tr>
<tr>
<td>3</td>
<td>Narcotics</td>
<td>Euphoric effect</td>
<td>Obscure (produces psychic sedation)</td>
<td>Morphine</td>
</tr>
<tr>
<td>4</td>
<td>Anticholinergics</td>
<td>Reduces salivary and bronchial secretions</td>
<td>Prevents vagal bradycardia</td>
<td>Glycopyrrolate</td>
</tr>
<tr>
<td>5</td>
<td>Neuroleptics</td>
<td>Psychotherapeutic effect</td>
<td>Psychic sedation</td>
<td>Chlorpromazine</td>
</tr>
</tbody>
</table>

**Table 2: Guidelines for premedications in pediatric dentistry**

<table>
<thead>
<tr>
<th>Sl. no.</th>
<th>Drug</th>
<th>Administration</th>
<th>Indications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Promethazin HCL (Phenergan)</td>
<td>Oral</td>
<td>1. Mild to moderate apprehension</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. May be combined with nitrous oxide for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>extreme apprehension</td>
</tr>
<tr>
<td>2</td>
<td>Hydroxyzine HCL or Pamoate</td>
<td>Oral</td>
<td>1. Mild to moderate apprehension</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2. May be combined with nitrous oxide for</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>extreme apprehension</td>
</tr>
<tr>
<td>3</td>
<td>Diazepam (Valium)</td>
<td>Oral</td>
<td>Extreme apprehension</td>
</tr>
<tr>
<td>4</td>
<td>Choral hydrate (NOCTEC)</td>
<td>Oral</td>
<td>Young 'Pre-cooperative' (3 Years or under)</td>
</tr>
<tr>
<td>5</td>
<td>Sodium pentobarbital (Nembutal)</td>
<td>IM</td>
<td>Young 'Pre-cooperative' (3 years or under)</td>
</tr>
</tbody>
</table>
are many issues, both pro and con, that influence the direction of development of a philosophy of pharmacological management of children for dental procedures universally accepted in medical, dental, business and societal communities. To begin a movement toward such philosophy, a well defined approach and initiative need to be mounted for a safe and prompt treatment. When used judiciously it can serve and protect but when in correctly used it can even kill. But it should be kept in mind that there is no alternative to have compassion, kindness and love in treatment that will not affect the psychology of the child.

REFERENCES