

Medical Evaluation for Outpatient Dental Procedures

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Family physicians are often consulted to evaluate medically a patient for various dental procedures. The majority of the referrals are for diseases of the cardiovascular system. General guidelines have been established at the University of Maryland Family Health Center for the evaluation of these patients. These guidelines pertain to the use of local anesthetics and prophylaxis for endocarditis, as well as to the evaluation of patients with cardiac disease, hypertension, pulmonary disease, endocrine disease, neurological disease, hepatic disease, pregnancy, and anticoagulant therapy.

The Family Health Center at the University of Maryland receives many patients to be evaluated medically for outpatient dental procedures. These patients are referred from the full-time dental resident in the Family Health Center and also from the dental school. Most of the referrals are in reference to evaluations of the cardiovascular system; however, they encompass any system or disease entity. This paper pertains to the evaluation of patients for dental procedures. General guidelines are proposed, although each patient must be evaluated as an individual. A complete history and physical examination is mandatory, with particular emphasis on the past medical history, drug history, allergies, and indications of bleeding tendencies. Appropriate laboratory tests should be performed, if indicated. Prolonged complicated procedures are best carried out in a hospital where anesthesia can be better controlled and where there are adequate facilities for recovery under close supervision.¹

The Use of Local Anesthetics

Much controversy exists in the literature regarding the safe use of local anesthetics with

catecholamine vasoconstrictors in patients with cardiovascular disease. The Special Committee of the New York Heart Association concluded that there was no risk to patients with cardiac disease if no more than 0.2 mg of epinephrine were used at any one time. This is equivalent to 16 ml of a 1:50,000 solution.² Most local anesthesia used in dental practice contains a 1:100,000 concentration of epinephrine.³

Glover stated that if 2 ml of 1:50,000 solution of epinephrine are injected subcutaneously, the amount entering the blood stream is less than 1 ng/min.⁴ This is less than ten percent of the rate of natural epinephrine production at rest and less than 0.3 percent of epinephrine produced when an individual is under the stress of a dental operation. Furthermore, 2 ml of a 1:50,000 solution injected intravenously over a period of one minute will result in a blood epinephrine level of 8 ng/liter. This has little effect and is totally metabolized in less than two minutes. Light muscular exercise such as walking produces a blood level of 4 ng/liter.

McAllister suggests that without vasoconstrictors the duration of anesthesia will be less. If the amount of anesthesia is less than desirable, the patient will suffer more distress and consequently produce a far greater quantity of endogenous epinephrine than that which would have been injected.⁵

Another study found no difference in the frequency of electrocardiographic changes after injections of local anesthetic containing concentra-

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tions of epinephrine ranging from 1:50,000 to 1:200,000. The slight changes in rhythm occasionally observed were not considered significant.⁶

The *Medical Letter* suggests that the hazard of an adverse effect on the diseased cardiovascular system from the small amount of epinephrine in dental local anesthetics has been somewhat exaggerated.³

Glover considered that epinephrine is safe and even desirable in local anesthetic solutions for cardiovascular patients provided: (1) the patient is premedicated to lower the rate of endogenous productions; (2) less than 0.2 mg is used; (3) intravenous injection is avoided; and (4) injection is slow (2 ml/min).⁴

Conversely, Aellig demonstrated that a concentration of 1:80,000 epinephrine produced tachycardia and concluded that this should not be used in patients with ischemic heart disease.⁷ Another study revealed that increases in blood pressure of up to seven percent systolic and 11 percent diastolic have occurred with 1:80,000 preparations of epinephrine. Although none of the patients in this investigation reported any symptoms, it was concluded that such increase in blood pressure may be hazardous in patients with preexisting hypertension or other cardiovascular disease.⁸ White suggests that a local anesthetic with no epinephrine or a 1:200,000 concentration should be used in patients with ischemic heart disease.⁹ Although lower concentrations of epinephrine, ie, 1/200,000, have been used to overcome the undesirable heart rate changes, the depth and duration of anesthesia have been unsatisfactory.¹⁰

The use of synthetic analogs of vasopressin, as alternative vasoconstrictors for conditions in which one may not want to use epinephrine, was suggested by Newcomb. He does, however, state that hemostasis is distinctly inferior to that obtained by epinephrine.⁶

Epinephrine is contraindicated in patients with hyperthyroidism, as they may be intolerant of even small amounts of this substance. Hypertensive patients treated with adrenergic-blocking agents are highly sensitive to sympathomimetic agents. Epinephrine is contraindicated in patients on tricyclic antidepressants and monoamine oxidase (MAO) inhibitors,³ because of their capacity to interfere with the uptake of epinephrine and potentiate its effect.

Finally, the current use of lidocaine for the

treatment of ventricular arrhythmias may cause concern regarding the cardiac effects of this agent. At nontoxic levels, however, lidocaine produces little or no alteration in electrical activities of the heart, hemodynamic properties of the heart, or peripheral vascular resistance.¹¹

Cardiac Disease

In patients with a history of myocardial infarction, all elective procedures requiring general anesthesia should be avoided for a postinfarction period of at least six months. Tarhan documented a 37 percent rate of reinfarction on patients anesthetized within three months of infarction. Delaying operations for three to six months after infarction reduced the incidence of reinfarction to 16 percent. The incidence of postoperative infarction stabilized at five percent after a six-month interval from the previous infarction.^{12,13}

Prevention of myocardial hypoxia by the reduction of psychogenic stress, anxiety, fear, and pain, and the minimization of the depressant pharmacologic action of anesthetic agents, are the objectives in anesthetic management of the cardiac patient. Preoperative sedation may be advisable to reduce anxiety and stress. The administration of general anesthesia to patients with severe heart disease on an outpatient basis is to be avoided.¹⁴ The use of a local anesthetic with a vasoconstrictor should be individualized depending on the severity of the disease. From the above discussion, it appears that if used judiciously and in small amounts there is little risk.

Elective procedures should obviously be deferred in patients with unstable angina, decompensated congestive heart failure, or uncontrolled arrhythmia. The same considerations used for the patient with myocardial infarction apply to the patient with stable angina, compensated congestive heart failure, controlled arrhythmias, coronary bypass, or a pacemaker. Short procedures with local anesthesia should present no problems.

The patient with angina may take nitroglycerine prophylactically prior to the procedure and should also have it available during the procedure.

Patients using digitalis, quinidine, procainamide, or propranolol to control an arrhythmia should not discontinue the medication for the procedure. Since the myocardial depression of general anesthesia is potentiated by the latter three

drugs,¹⁵ general anesthesia should be avoided as an outpatient.

The hypertensive patient's blood pressure should be well controlled for elective and/or extensive procedures. Medications should be continued for the procedure and a local anesthetic with epinephrine may be used judiciously. McAllister suggests that if for any reason a hypertensive reaction occurs in response to an injection of a substance containing epinephrine, it may be rapidly abolished by an intramuscular or intravenous injection of phentolamine.⁵ Antihypertensive drugs may cause additive hypotensive effects with general anesthesia. General anesthesia, therefore, should not be performed without proper monitoring.

Prevention of Bacterial Endocarditis

The Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis of The American Heart Association recommends antibiotic prophylaxis in all patients at risk for bacteremia in all dental procedures that are likely to cause gingival bleeding. This includes routine professional cleaning. An exception to this is simple adjustment of orthodontic appliances and the shedding of deciduous teeth. Patients at greatest risk include those with congenital heart disease, rheumatic or other acquired valvular heart disease, idiopathic hypertrophic subaortic stenosis, mitral valve prolapse syndrome with mitral insufficiency, and prosthetic heart valves. The suggested approach to prophylaxis has become somewhat more aggressive since guidelines issued in 1972.

Regimen A consists of aqueous crystalline penicillin G, 1,000,000 units intramuscularly mixed with procaine penicillin G, 600,000 units $\frac{1}{2}$ to 1 hour prior to the procedure, followed by 500 mg of penicillin V orally every six hours for eight doses. An alternative is to give 2.0 gm of penicillin V orally $\frac{1}{2}$ to 1 hour prior to the procedure, and then 500 mg every six hours for eight doses. Patients allergic to penicillin should be given erythromycin, 1 gm orally $1\frac{1}{2}$ to 2 hours prior to the procedure, and then 500 mg orally every six hours. Vancomycin may also be used in penicillin-sensitive patients. The above dosages are reduced in children.

Regimen B consists of the combination of penicillin plus streptomycin. This is specifically recommended as the only prophylactic regimen

for patients with prosthetic heart valves; however, it may be used in place of Regimen A for any high-risk patient. Also, patients who are receiving continuous oral penicillin for secondary prevention of rheumatic fever may have alpha hemolytic streptococci in the oral cavity which are relatively resistant to penicillin. While it is likely that the doses of penicillin recommended in Regimen A are sufficient to control these organisms, one may choose Regimen B or oral erythromycin.¹⁶

Pulmonary Disease

Asthmatic patients should present no problem for routine dental procedures. They may react poorly to irritant anesthetic agents and these agents should be avoided. Local anesthesia is the preferred technique. Bronchodilators such as epinephrine should be available.

Sedation, general anesthesia, oxygen, and nitrous oxide should be avoided in patients with chronic obstructive pulmonary disease. The basic stimulus to respiration is hypoxia, and the above procedures may remove this respiratory drive with the possibility of prolonged apnea ensuing.

Endocrine Disease

The diabetic patient should be as well controlled as possible. Even for the uncomplicated diabetic, operation and anesthesia may present additional metabolic stress which may predispose to ketosis and hyperglycemia. Hypoglycemia is also a hazard, particularly in the poorly regulated patient. It is important to determine whether the patient will be able to eat after the procedure, and then to adjust insulin accordingly. General anesthesia for the diabetic patient on a moderate quantity of insulin or in poor control warrants hospitalization for the procedure.¹⁴

Dental procedures are not contraindicated in patients with thyroid disease who are maintained in the euthyroid state by medication. Elective procedures should be deferred in those individuals with marginal thyroid function as they may react adversely to even small amounts of anesthetic agents. The use of ambulatory general anesthesia and local anesthesia with vasoconstrictors is contraindicated for patients with hyperthyroidism. Patients with hypothyroidism are very sensitive to the cardiorespiratory depressant effect of anesthetics and narcotic analgesics.¹⁴

Neurological Disease

Sedation may be indicated in the patient with epilepsy or a seizure disorder if severe anxiety or fear is apparent. This may avert precipitation of a seizure due to the increase in psychic stress or sympathoadrenal response. Seizure precautions such as an airway and padded tongue blade should be available.

Pregnancy

While normal pregnancy in itself does not contraindicate necessary dental treatment, elective surgery and major restorative procedures should be deferred to the postpartum period. It is best to avoid any procedure during the first trimester since this is the period of organogenesis, and any fetal hypoxia may produce deleterious effects upon the developing fetus or cause a possible spontaneous abortion. The hazard of premature delivery during the third trimester should preclude elective procedures and general anesthesia. For the normal pregnant patient the second trimester is the best time for dental treatment. Regional anesthesia is the technique of choice.¹⁴

Anticoagulant Therapy

The advisability of surgery on patients receiving anticoagulants remains controversial. Ellison believes that except for surgery of the eye, central nervous system, or large raw surfaces such as the liver bed, and in the absence of other contraindications, major surgical procedures can be safely carried out.¹⁷ Hospitalization is advised for surgical procedures.

Prothrombin time should be determined prior to surgery. The duration of anticoagulant action may be as long as four or five days, depending on the preparation of coumarin. The intake of other drugs may also cause altered sensitivity to coumarin.

If one elects to discontinue coumarin for the procedure, it may be stopped abruptly. Michaels has reported that cessation of anticoagulant therapy carries no greater risk of recurrent embolism than elective discontinuation,¹⁸ and that the manner of termination (tapered vs abrupt) does not affect the incidence of thromboembolic relapse.¹⁹

Because local hemorrhage may be undetected,

regional anesthesia and/or intramuscular sedation should be avoided. Ellison recommends that any patient with a coagulation defect, be it congenital or iatrogenic, should have general anesthesia if no other contraindication exists.¹⁹

Hepatic Disease

Tolas states that dental procedures are contraindicated in patients with active hepatitis until recovery from the disease is complete. This is to prevent exacerbation of the disease in the patient and to circumvent the possibility of spread of the disease by contamination of dental personnel or patients.

A prothrombin time is indicated in patients with hepatic disease because of the possibility of hemorrhagic diathesis.

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