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articles

Management of Dental Problems in Patients with Cardiovascular Disease

*Report of a Working Conference Jointly Sponsored by the
AMERICAN DENTAL ASSOCIATION AND AMERICAN HEART ASSOCIATION*

Advances in therapy for and the increasing number of patients with cardiovascular disease have necessitated a review of the problems encountered in these patients who need dental care. For this purpose a conference, jointly sponsored by the American Heart Association and the American Dental Association, was held in April, 1963 to discuss the "Medical-Dental Management of Patients with Cardiovascular Disease." This report and subsequent additions represent the recommendations of this conference.

Advances in medical science and other factors have resulted in an increasing number of people who are living into the advanced years. The latest figures released by the Office of National Vital Statistics reveal the life expectancy of the American citizen in 1960 to be 69.7 years and for 1961 the preliminary estimates reveal an expectancy of 70.2 years.

As life expectancy increases, certain disease processes become prominent. Approximately 60 per cent of individuals

over 60 years of age have some chronic disease. Cardiovascular problems are an important segment of this group. It is estimated that there are over ten million people in the United States with some form of cardiovascular disease, and the various forms of cardiovascular problems are responsible for 54 per cent of all deaths in this age group.

Patients with cardiovascular diseases are of particular interest to the dentist since they have a decreased ability to

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recover from stress. Therefore, the dentist is often required to alter his treatment so that it will have no ill effect on the patient's over-all condition.

However, dental treatment should not be denied a patient because of a cardiovascular problem. With only a few exceptions, dental treatment, when properly performed, is safe. Maintenance of the oral cavity in a state of health is possible for these patients and should be the goal of the dental profession. Generally speaking, a fully ambulatory patient without cardiac symptoms, who can come to the office, is suitable for outpatient care.

Management of dental problems in patients with cardiovascular disease requires close cooperation between the physician and dentist. The physician must be aware of the dentist's problem, and, in turn, the dentist should know the medical problem and the limitations it imposes. There is need for mutual understanding, respect, and cooperation between the physician and dentist if the best interest of the patient is to be served. When dental treatment is necessary, the dentist should discuss the problem with the patient's physician and proceed only after there has been agreement on the course of action. The physician should know what type of dental treatment is involved and the drugs and medicaments to be used so he can intelligently evaluate the problem and give sound advice.

Should a medical HISTORY be taken by the dentist?

An adequate medical history should always be taken for the protection of the patient since most cardiovascular diseases can be detected in this manner. The history should contain the name of the patient's physician and reveal pertinent information regarding any previous illness, bleeding tendencies, unusual symptoms or allergies, and drugs or medicaments the patient is taking. Specific questions regarding cardiovascular disease

should be included. When a history of cardiovascular disease is obtained, or if any bleeding problem or medicaments the patient is taking suggest cardiovascular disease, the dentist should consult the patient's physician before proceeding with dental treatment.

A sample questionnaire that is extremely useful to the dentist is included in Appendix A.

Periodic re-evaluation of this medical history is of great importance and must be kept current. This can be accomplished chiefly by obtaining the following information from the patient on succeeding visits:

1. Has there been any change in the patient's health since the last history was recorded?
2. Is the patient receiving any new drugs (medication)?

What PREVENTIVE dental procedures are indicated when it is discovered the patient has cardiovascular disease?

Because of the progressive nature of many cardiovascular diseases and the decreased ability of patients to tolerate stress, preventive dental procedures should be instituted early in the course of such conditions. When a diagnosis of cardiovascular disease is first made, the physician should refer the patient to a dentist for complete oral and dental evaluation, and any required treatment should be completed at this time. Periodic re-examination and performance of any treatment necessary to maintain the oral cavity in a state of health is essential.

What DRUGS commonly taken by patients with cardiovascular disease require special precautions?

To avoid reactions, special precautions must be taken by the dentist when he is treating a patient who is taking one of the following drugs:

1. **Diuretics and antihypertensive drugs.** These drugs may predispose to orthostatic hypotension and patients may faint when changed from a relatively prone position to a sitting or standing position.
2. **Nitroglycerine.** A patient who takes nitroglycerine for angina pectoris should always have a supply of fresh tablets immediately available when he visits the dentist. If an angina attack occurs during dental treatment, all procedures must be interrupted, and nitroglycerine should be taken according to previous instructions from the patient's physician.
3. **Rauwolfia compounds, guanethidine or ganglionic blocking agents.** These drugs potentiate the response to vasoconstricting drugs. Therefore, the injection of local anesthetics containing vasoconstrictors should be carefully administered in order to avoid intravascular injection since any resulting blood pressure changes may be extremely hazardous. The frequency of syncope is also increased in patients taking these drugs.

Should SALIVA-INHIBITING DRUGS be administered to a patient with cardiovascular disease?

Saliva-inhibiting drugs such as atropine and methantheline should not be administered to a patient with cardiovascular disease until his physician has been consulted since the dosage of either drug, commonly used in dental practice, often produces tachycardia.

Is it good practice to PREMEDICATE the cardiovascular patient to prevent apprehension?

In cardiac patients with coronary, hypertensive, or syphilitic heart disease, or with congestive heart failure from any cause, preanesthetic sedation with short-acting barbiturates is advised. Apprehension may thus be decreased and blood pressure rises minimized or prevented in the waiting room period, as well as in the dental chair. Because of their short-acting period and wide use, pentobarbital in a dosage of 50 to 100 mg., or secobarbital in a dosage of 50 to 100 mg., are satisfactory for most adults, *although dosage must be on an individual basis and the drug carefully administered.*

Since occasional patients react unfavorably, or even paradoxically, to these

drugs, patients should be carefully questioned as to whether they have taken the drug previously. The medication should be given in the waiting room at least 45 minutes before the surgical procedure. Tranquilizing (ataractic) drugs may, on occasion, be used instead. All individuals who take barbiturates should have someone accompany them to the dentist's office as a precautionary measure.

Caution: Dangerous hypotensive episodes or orthostatic hypotension may occur when sedatives are given to patients being treated for cardiovascular disease with certain drugs such as ganglionic blocking agents or hydralazine (Apresoline), guanethidine (Ismelin), methyl-dopa (Aldomet), phenothiazines and Rauwolfia drugs. These agents also prolong the action of analgesics, sedatives and tranquilizers. Therefore, special caution must be exercised when administering sedatives to patients taking these drugs.

Is it necessary to administer prophylactic antibiotic therapy to prevent BACTEREMIA and BACTERIAL ENDOCARDITIS?

Bacteremia is frequently associated with extraction of teeth, other oral surgical procedures, and manipulation of perio-

dontal tissue. The frequency and severity of bacteremia in dental procedures are related to the degree of trauma.

Prophylactic therapy against subacute bacterial endocarditis is indicated for all patients with rheumatic fever scarred valves or congenital heart defects. Unfortunately there is, at the present time, no known antibiotic dosage regimen which is completely effective in preventing bacteremia and bacterial endocarditis following traumatic dental procedures. The majority of such patients, however, can be protected from endocarditis by the administration of appropriate antimicrobial agents. The drug of choice is penicillin. Treatment schedules, originally outlined by a special committee of the American

Heart Association and reviewed in 1960, are recommended and are found in Appendix B.

What type of ANESTHETIC should be given for dental procedures when the patient has cardiovascular disease?

Local anesthesia, properly administered, is generally the anesthesia of choice. It is particularly important to provide complete and total local anesthesia and to eliminate apprehension to minimize the discharge of endogenous epinephrine. The following procedures should be followed in the administration of local anesthetics:

1. Use adequate premedication.
2. If a patient is known to react to a specific local anesthetic, another anesthetic of different chemical structure should be used.
3. Reduce pain at the injection site.
4. Use the smallest quantity of the lowest concentration anesthetic compatible with the problem at hand.
5. Use minimal concentrations of vasoconstrictors.
6. Inject slowly with minimal pressure.
7. Multiple injections should be spaced in time.
8. Following injection, keep patient under close observation. If unusual reactions develop, promptly instigate any indicated resuscitative and/or supportive measures.

Why is it important to avoid INTRAVASCULAR INJECTION?

The intravascular injection of local anesthetics is a real danger to anyone, and particularly to those patients with cardiovascular disease. Without special precautions, the concentration of local anesthetics and/or added vasoconstrictors may be inadvertently *built up*, and death or serious cardiovascular complications may result. Intra-arterial injections provoke distant anesthesia and blanching of the immediate area while intravenous injection may cause central nervous system

stimulation or depression and produce hypertensive crises or dangerous degrees of myocardial ischemia. Intravenous injection is probably the cause of most reactions to local anesthesia in dentistry. The instruments most commonly used by dentists do not allow for preliminary aspiration. However, *aspirating cartridge syringes, now on the market*, provide increased safety for the patient with fewer anesthetic failures, as well as fewer anesthetic "reactions."

Intravascular injection can be avoided, provided that the following precautions are observed:

1. Use a needle no smaller than 25-gauge. Smaller needles often prevent aspiration.
2. Prevent intravascular injection by aspirating before injection.
3. If the position of the needle is changed during injection, reaspirate before continuing the injection.
4. If blood is aspirated the cartridge should be discarded and another cartridge used.

When are GENERAL ANESTHETICS indicated on patients with cardiovascular disease?

General anesthesia or general analgesia is hazardous in patients with cardiovascular disease, particularly those with ischemic heart disease, e.g., angina pectoris, myocardial infarction or coronary insufficiency. However, for the extremely apprehensive patient or for complicated surgical procedures, general anesthesia may be indicated. These patients are ideally treated in a hospital environment or one with comparable facilities.

Is it safe to use a VASOCONSTRICTOR in the local anesthetic for the cardiovascular patient?

A vasoconstrictor agent is generally indicated as a component of a local anesthetic preparation because it insures more profound anesthesia and limits the rate of absorption of the local anesthetic agent. The concentrations of vasoconstrictors normally used in dental local anesthetic solutions are not contraindicated in patients with cardiovascular disease when administered carefully *and with preliminary aspiration*. The following concentrations can be used: epinephrine, 1:50,000-

1:250,000; levarterenol, 1:30,000; levonordefrin, 1:20,000; and phenylephrine, 1:2,500.

The special precautions in administering local anesthetics listed above should be meticulously followed.

When GINGIVAL RETRACTION or HEMOSTASIS is required for dental procedures on patients with cardiovascular disease, should agents containing vasoconstrictors be used?

The use of vasoconstrictors for gingival retraction or hemostasis is potentially dangerous and should be avoided.

How may the dentist determine the extent of the DENTAL PROCEDURES that may be accomplished at ONE TIME?

All dental procedures are not of the same magnitude and since patients with cardiovascular disease have varying capacities to withstand stressful situations no hard and fast rule can be set forth as to the amount of dental work that should be done at any one time. The following, however, can be used as a guide in determining the extent of the procedure:

1. The number of teeth to be extracted or the extent of any dental procedures to be completed at one time should be determined by the amount of trauma involved and the patient's ability to withstand the trauma. This ordinarily calls for discussion of the problem with the patient's physician.
2. Patients who have chest pain, marked periodic pallor or exhibit breathlessness, alteration in consciousness, faintness, and/or have a very labile or rapid pulse

should not be subjected to extensive or traumatic procedures without prior medical consultation, since these symptoms may indicate serious heart disease.

3. Dental procedures should be avoided for a period of at least three months after the patient has had a coronary heart attack. However, in cases of a dental emergency prior to the lapse of three months, minimal dental procedures should be handled in consultation with the patient's physician.
4. Serious heart disease is unlikely in those people who can do strenuous exercise (such as rapid stair climbing) without discomfort and such patients can tolerate dental procedures well.

If a patient is taking an ANTICOAGULANT DRUG, should the drug be withdrawn if a surgical procedure is necessary?

The use of anticoagulants is increasing, and many physicians believe that patients with coronary artery disease should be kept on this therapy permanently. Some types of actual or threatened strokes are also considered indications for the long-term use of anticoagulant drugs.

The reported results of either continuing or stopping anticoagulant therapy for dental extraction are somewhat conflicting. The sudden withdrawal of anticoagulant drugs, especially if any vitamin K preparations are administered, may cause thrombosis or embolism. Conversely, if anticoagulant drugs are continued at full doses, profound bleeding may occur.

Therefore, when periodontal surgery, extractions or other dental surgical procedures are planned, the physician, in consultation with the dentist, should *gradually* reduce the dosage of oral anticoagulants to maintain the prothrombin times at approximately 1½ times the con-

trol level. Dental surgical procedures may then be carried out without undue bleeding, if the operative site is sufficiently limited to permit the effective use of local procedures for hemostasis, including use of an absorbable hemostatic agent, sutures, and prolonged pressure applied to a gauze dressing placed over the wound.

No modification in dosage is required for injection of local anesthetics but prolonged pressure over the injection area may be desirable to prevent hemorrhage.

How can a cardiac EMERGENCY be recognized? If a cardiac emergency occurs, how should it be treated?

A cardiac emergency may occur in a dental office in a patient with known cardiac disease or it may be the patient's first manifestation of cardiac disease. Such emergencies should be suspected when the patient experiences chest pain, persistent breathlessness or prolonged fainting and unconsciousness. When confronted with any of these problems, the following therapy should be carried out:

1. **Be calm:** It is of the UTMOST IMPORTANCE that the dentist remain calm and reassure the patient.
2. **Chest pain**
 - a. Place patient in sitting position.
 - b. Administer oxygen.
 - c. Have the patient place a fresh tablet of nitroglycerine under his tongue (if patient is using the drug).
 - d. Call physician.
 - e. Do not administer epinephrine.

3. **Persistent breathlessness**
 - a. Place patient in sitting position.
 - b. Administer oxygen.
 - c. Call physician.
4. **Fainting**
 - a. Place patient in recumbent position with legs raised.
 - b. Have patient inhale aromatic spirits of ammonia.
 - c. Administer oxygen.
5. **Unconsciousness**
 - a. Place patient in recumbent position with legs raised.
 - b. Make sure airway is patent and administer oxygen.
 - c. If patient is not breathing, give artificial respiration.
 - d. If the pulse cannot be detected after 30 seconds or if an audible heart beat with ear on chest cannot be detected after 30 seconds, institute external closed chest cardiac resuscitation and other required resuscitative procedures. (Information about closed chest cardiac resuscitation is available from your local heart association.)

APPENDIX A

Medical History

1. Have you ever been under the care of a doctor (physician, dentist, osteopath or chiropractor)? _____
 If so, by whom, for what and when? _____
2. Are you now under the care of a doctor? _____
 If so, by whom, for what and when last seen? _____
3. Do you have or have you ever had any of the following? _____

a. rheumatic fever _____	g. stroke _____
b. high blood pressure _____	h. apoplexy _____
c. coronary heart attack _____	i. heart failure _____
d. valvular heart disease (leaky valve) _____	j. syncope _____
e. abnormal heart murmur _____	k. syphilis _____
f. angina _____	l. kidney failure (uremia) _____
	m. epilepsy _____
4. Have you had or do you have any of the following? _____

a. chest pain or distress (tightness) _____	g. bleeding tendencies (unusual) _____
b. shortness of breath _____	h. easy bruising _____
c. coronary heart attack _____	i. dizziness _____
d. fainting or convulsions _____	j. cough (chronic) _____
e. swelling of ankles _____	k. recent jaundice _____
f. rapid heart beat without provocation (palpitation) _____	

5. Do you have any discomfort in the wrists, arms, chest, neck or jaws during strenuous exertion or during excitement? _____

6. Have you ever taken or are you now taking any of the following drugs? (This list of drugs must be kept up-to-date) _____

a. digitalis _____	h. antibiotics _____
b. nitroglycerine _____	i. Rauwolfia [Rauwolfia serpentina (Raudixin) reserpine (Serpasil)] _____
c. quinidine _____	j. guanethidine (Ismelin) _____
d. anticoagulants (medicines to thin blood or delay clotting) _____	k. methyldopa (Aldomet) _____
e. cortisone _____	l. tranquilizers _____
f. medicines for high blood pressure _____	m. antihistamines _____
g. diuretics _____	n. insulin _____

7. Are you taking any other drugs, patent medicines or chemicals? If so, what? _____

8. Are you sensitive or allergic or do you react peculiarly (example: develop hives) to certain foods or any of the following drugs?

a. antibiotics _____	d. antihistamines _____
b. serums _____	e. state which foods you are allergic to _____
c. local anesthetics _____	

9. Have you ever experienced an unfavorable reaction during surgery or dental treatment? _____

APPENDIX B

Dentist's Guide to Prophylactic Methods against Bacterial Endocarditis for Patients with a History of Rheumatic Fever or with Rheumatic Heart Disease or a Congenital Heart Defect

General Recommendations for Protection During Dental Manipulations and Oral Surgery*

Penicillin is the drug of choice for administration to patients with rheumatic or congenital heart disease undergoing dental manipulations or surgical procedures in the oral cavity.

Although the exact dosage and duration of therapy are empirical, there is some evidence that for effective prophylaxis, reasonably high concentrations of

penicillin must be present at the time of these procedures. *The dosage regimens employed for long-term prophylaxis against group A streptococci in rheumatic susceptibles are inadequate for preventing bacterial endocarditis.* To prevent organisms from lodging in the heart valves or to eradicate them promptly before the formation of a vegetation, high levels of penicillin in the blood over a period of

*From "Prevention of Rheumatic Fever and Bacterial Endocarditis Through Control of Streptococcal Infections," statement revised 1960 by the Committee on Prevention of the Council on Rheumatic Fever and Congenital Heart Disease of the American Heart Association.

In addition to the treatment schedules outlined here, the full statement suggests a schedule in which the intramuscular route is used throughout, employing procaine and crystalline penicillin.

Copies of the complete statement are available from your local heart association or through the American Heart Association.

several days after the given procedure are recommended.

Extraction of teeth from badly infected gums is apt to result in more intense bacteremia than when infection is minimal or absent. If prophylaxis is instituted 24 to 48 hours prior to the operative procedure, it may decrease the intensity of bacteremia. Since occult infection may be present, some workers recommend that treatment always be started several days prior to the operative procedure. On the other hand, some workers have been concerned that pretreatment might lead to the emergence of antibiotic-resistant microorganisms. These would constitute a very difficult therapeutic problem if they implanted in the valves. It has, therefore, been argued that prophylaxis should not be instituted until immediately before the operative procedure.

In view of the lack of definitive evidence to support categorically either method, the physician must evaluate the likelihood of infection and decide whether a period of preliminary treatment prior to the operative procedure is indicated. It is emphasized that there is *no disagreement* regarding the advisability of using antimicrobial agents immediately before and subsequent to the operative procedure.

Suggested Treatment Schedules

Oral Plus Intramuscular Penicillin
For Two Days Before Dental Procedure
(optional)

500,000 units of buffered penicillin G or phenoxymethyl penicillin (penicillin V), by mouth four times a day.

Day of Dental Procedure

500,000 units of buffered penicillin G or phenoxymethyl penicillin (penicillin V), by mouth four times a day, supplemented by 600,000 units crystalline penicillin I.M. one hour before surgical procedure.

Two Days Following Dental Procedure

500,000 units of buffered penicillin G or phenoxymethyl penicillin (penicillin V), by mouth four times a day.

Oral Penicillin

Because of practical considerations some physicians and dentists rely on oral penicillin alone when the full cooperation of the patient is assured.

Each oral dose: 500,000 units buffered penicillin G or penicillin V.

Oral dosage four times a day for two days before dental procedure (optional), on day of dental procedure, and two following days.

Caution: For patients who are sensitive to penicillin, employ erythromycin: 250 mg. by mouth q.i.d. for adults and older children; for small children, 20 mg. per pound per day in three or four evenly spaced doses, not exceeding 1 Gm. per day.

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