A TEXTBOOK OF PREVENTIVE DENTISTRY

CALDWELL
and
STALLARD

A TEXTBOOK OF PREVENTIVE DENTISTRY

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In Memory

ROBERT C. CALDWELL

Every man has special qualities that in combination form his character. Bob Caldwell possessed six distinctive characteristics that served as guidelines for his life and work: intelligence, imagination and leadership were tempered with courage, love and humor. Throughout his life, these qualities inspired the respect and admiration of his associates.

Bob loved his family, his people and the sea. He genuinely enjoyed being with friends, or even with strangers. He never ate alone in his laboratory or office, preferring to share the noon hour with someone. On these occasions, it was always surprising to see the number of people from every facet of life whom he knew personally. Chance meetings with these acquaintances prompted responsive smiles and an interesting exchange of enquiries concerning the activities of each. Bob's capacity for love made him warm and friendly with people, and understanding as an administrator.

His intellect was quick, clear and full of insight. These qualities made him recognize the importance of advanced education in his profession. He was highly successful in his graduate studies, and his sensitiveness to the suffering of people led him to maintain a balance in his research between satisfying his scientific curiosity and seeking practical applications of his findings for the benefit of mankind.

Two qualities that contributed much to his successful career and his productivity in the dental field were imagination and leadership; these enabled him to plan and launch the Institute of Dental Research in Birmingham and, subsequently, to set on course the troubled School of Dentistry at U.C.L.A. His vision led him to recognize the value of the concept of an institute where people from different disciplines would work both independently and conjointly to achieve advances in dental health. Bob's strong leadership, colored by his enthusiasm and perception, attracted many men to work together in this dream, which continues today as a reality and a challenge to those who carry on the work he began.

Bob was courageous. He displayed this quality throughout life, especially during his last years. His dignity and his sensitivity for others allowed him to share the truth of his illness only with his wife Marge. The quiet strength of this man, who so courageously faced life and death, is our inspiration.

Bob had two special gifts that enhanced his other qualities: his smile and his wit. These things we remember about Bob: the warmth of his handshake when he greeted you, the warm smile and the ready wit, which could disarm you in a discussion or give you a lift at the end of a weary day. We respect the scholar, the leader, the founder, but we deeply love the smiling, compassionate man whom we were privileged to call our friend.

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PREFACE

This text on preventive dentistry is intended to provide a base on which current concepts can be utilized by those members of the dental profession dedicated to the preservation of the natural dentition. Each subject unit is treated in detail and is in turn linked to the other units to provide a total picture of prevention as it can be practiced today. Both clinical and research data are included upon which sound judgment can be made. Additional reading lists accompany each chapter for those who desire to expand their knowledge in a given area.

I am indebted to all of the contributors to this text for their patience and understanding during the protracted period of preparation resulting, ultimately, in publication. Chapters have been updated and additional references added to include the most current materials available in all areas. I am also indebted to the staff at Saunders for their cooperation and utmost care in preparing the material. Special appreciation is extended to Mrs. Pamela Phillips for her secretarial assistance.

My thanks and appreciation are extended to Mrs. Marge Caldwell for her encouragement, initially to her late husband and finally to me, during all phases of preparation of this book. I am especially grateful to my wife, Jaxon, for her continuing support.

RICHARD E. STALLARD
Minneapolis, Minnesota

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chapter 1

PREVENTIVE DENTISTRY AND TOTAL PATIENT CARE

by
ROBERT C. CALDWELL, D.D.S., PH.D.

Preventive dentistry can be defined as the employment of all measures necessary to attain and maintain optimal oral health. In a general sense, there is primary prevention and secondary prevention. Primary implies the prevention of the initiation of disease and is the highest goal of preventive dentistry. Secondary prevention includes the prevention of additional disease or the recurrence of disease. An example of this is the time-honored concept of "extension for prevention" in operative dentistry.

Preventive dentistry encompasses a broad range of dental science and the scope of the subject includes:

1. factors predisposing to disease, e.g., dental plaque and other deposits;
2. factors encouraging the advance of disease, e.g., host resistance and trauma from occlusion;
3. complications of disease and deformity, e.g., loosening, drifting and malpositioning of the teeth;
4. factors interfering with rehabilitation, e.g., defective restorative dentistry; and
5. factors causing the recurrence of disease, e.g., poor oral hygiene and lack of patient motivation.

The approach to preventive dentistry recommended in this book requires an understanding of certain principles and how they relate to the overall sequence of events in total patient care. Therefore, before describing how preventive dentistry relates to a total patient care program, total patient care should be defined. "Total" clearly implies two things: (a) it is concerned with the whole patient, and (b) the care which is total is the sum of several factors. A definition of "care" includes attending to the patient, which is quite adequately done in most dental practices and clinics. However, a broader meaning suggests watching over the patient, thereby implying a responsibility for the maintenance of oral health. Thus, total patient care consists of the establishment and maintenance of health in

addition to treatment of disease and deformity. This comprehensive approach to dental practice includes an effective preventive dentistry program.

PRINCIPLES OF PREVENTIVE DENTISTRY

The principles of preventive dentistry are:

1. Control of disease,
2. Patient education and motivation,
3. Development of host resistance,
4. Restoration of function, and
5. Maintenance of oral health.

Each of these principal areas will now be discussed and synthesized into a logical sequence of events for total patient care. This sequence should be adhered to whenever possible, but flexibility is desirable and professional judgment may alter the recommended order of events.

CONTROL OF DISEASE

It is an established fact that bacteria are one of the causative agents of dental caries and periodontal disease. Thus, the dental practitioner should recognize the importance of reducing the number of bacteria and/or the virulence of the oral microflora. It makes little sense to sew up a festering wound without attending to the cause of the infection. Similarly, it is poor dentistry to place permanent restorations in a mouth in which the infection will continue to be rampant. Some dental authorities recommend that a permanent restoration should not be placed in a mouth with active caries until every carious tooth has been excavated, indirect pulp capping carried out where indicated, and temporary restorations inserted.

Control of infection is equally important in the management of periodontal disease (Fig. 1–1). Periodontists do not undertake extensive treatments where oral hygiene is unsatisfactory. The patient is first brought to the state where the infectious causative factors are controlled and the chance of recurrence of disease has been reduced. The first step in the management of most periodontal disease and caries is to control the infection.

The recommended procedures in this first stage of total patient care are as follows:

1. Emergency treatments for the relief of pain are first on the program. Also, acute problems must receive immediate attention; for example, a chipped tooth which is causing soft tissue ulceration should be smoothed with a disc or covered with a temporary restoration. Similarly, a tooth requiring drainage and therapy to obviate an abscess must receive prompt attention.

2. For children and adults with active carious lesions, the removal of all caries, indirect pulp capping where necessary, and the placement of temporary restorations are next in the care program. The rationale is that the carious infection must be reduced in its intensity as soon as possible. The patient is not well served by the dentist proceeding from one restoration to the next without having attempted to control the caries process in the whole dentition. Thus, all large carious lesions should be excavated and temporary restorations inserted. Permanent restorations will come later.

3. The removal of plaque and calculus by prophylaxis and topical fluoride treatment aids in the control of the infectious carious and periodontal process. In older patients with low or no caries activity, periodontal therapy will usually follow the emergency treatment phase. A plaque control program must be initiated along with the patient education and motivation program.

4. The removal of teeth indicated for extraction is now appropriate. Delaying this step has allowed the dentist to improve the oral health of the patient and has created a more favorable environment for post-extraction healing. Also, the patient has had time to gain confidence in the dentist before facing the worry of having a tooth extracted.

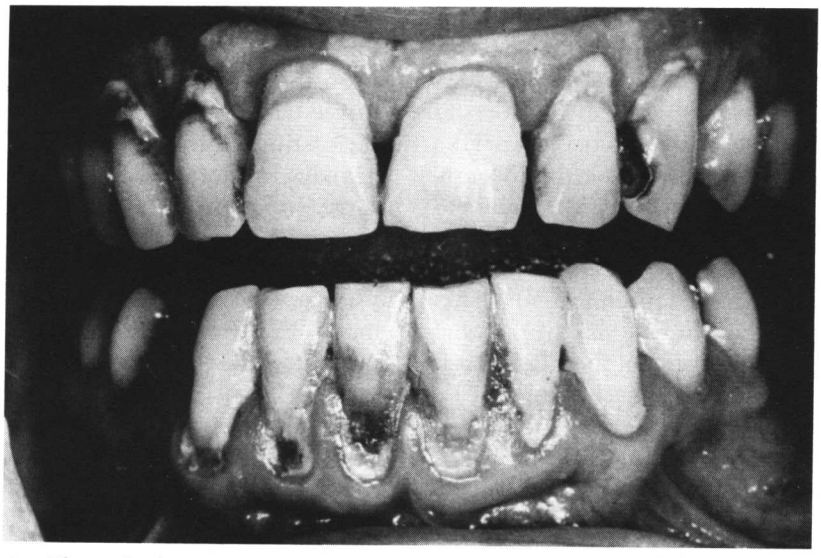

Figure 1–1 Clinical photograph of a 35-year-old patient demonstrating advanced periodontal disease and dental caries. Plaque is acting as a common etiologic factor in both disease processes in this patient.

PATIENT EDUCATION AND MOTIVATION

The intimate relationship of plaque bacterial deposits on the enamel surface and the gingival tissue is a continuing challenge to the integrity of these tissues. The dentist cannot expect to handle this problem successfully alone, and the patient or parent plays a highly significant role in the care of the oral tissues.

Some dentists may not be consciously aware of the deep desire of many patients to achieve optimal dental health. Certainly there are people who place a low priority on dental health, but an encouragingly large percentage of these will change their attitude if dental facts are presented to them in an interesting and positive fashion. Also, dental care is becoming more fashionable and desirable; for example, the sale of electrically powered toothbrushes and water-jet dental appliances has been remarkably increased in the last few years.

The experienced dentist knows that there is no long-range benefit to patient or dentist in technically good restorations in a neglected mouth. To protect the patient's investment and the dentist's reputation, the patient must understand the factors which cause dental problems. It is also important that the patient be motivated to work with the dentist by maintaining a high level of home care and avoiding dietary and mechanical abuses to the dentition.

In the first phase, control of disease, the dentist has laid the biological groundwork for the long-term treatment plan. The temptation at this stage is to press ahead with permanent restorations. This should not be done until a program of patient education and motivation is firmly established.

Evaluation and Education. The condition of the patient's oral health is now evaluated and pertinent information is passed on to the patient. What was the extent of infection? Was the patient in a "caries-rampant" condition? If so, why? Was the extent of gingivitis unusual? Are there periodontal problems which can be attributed to neglect or abusive oral habits? To ask these types of questions, the dentist has to have a mental image of what is normal for the patient at his stage of development and age. A numerical scale relating the average amount of caries and periodontal disease to patient age can be helpful in categorizing the severity of dental disease.

Home Care Instruction. Home care in-

struction is now begun. The details of oral hygiene techniques and home care are included in Chapter 13. The dentist or his assistant should show the patient that dental plaque is composed mainly of bacteria. This can be done by phase contrast microscopy or by using a patient education film. The patient should be told that brushing does not necessarily mean effective cleaning. In fact, one can over-brush and under-clean. This can be demonstrated by the use of red discoloring wafers which reveal the plaque left *in situ* after the patient has brushed (Fig. 1–2). The proper cleaning technique is then taught, the proper technique being the one which gently removes all the plaque from all surfaces. Flossing usually must supplement brushing for a thorough job.

DEVELOPMENT OF HOST RESISTANCE

Oral health seems to depend on a delicate balance between factors which cause increased susceptibility and those causing increased resistance to disease. The successful treatment and subsequent maintenance of the periodontal structures may depend on increased host resistance. Similarly, dental caries can be controlled to some extent by increasing host resistance even though cariogenic factors may remain active. In both periodontal disease and caries the control of infection is usually of primary importance, but considerable benefits are obtained by the development of host resistance.

Nutrition and Host Resistance. An analysis of the patient's diet should now be made. For the young child and the geriatric patient proper nutrition is especially important. In addition to an adequate caloric intake, the diet should be balanced with respect to protein, fat and carbohydrate. Sufficient variety is important to provide adequate vitamins and trace minerals. Fluoride in water or tablets is also important during the early years.

The importance of avoiding sticky, fermentable sweet foods and between-meal snacks should be emphasized. The Vipeholm study showed that there could be a sevenfold increase in dental caries in subjects eating candies frequently between meals. The diet history should be reviewed with the patient or parent. Patient education films can be used to good advantage in laying the groundwork for necessary changes in the dietary habits.

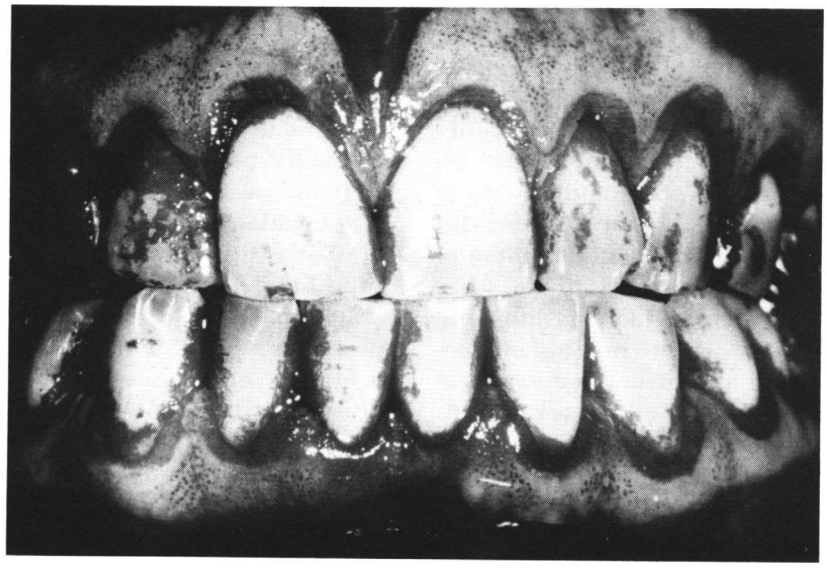

Figure 1–2 The plaque remaining in this patient's mouth has been stained with disclosing tablets. Note that even in a state of reasonably good oral hygiene plaque is present in the non-self-cleansing areas of the teeth.

Fluorides. During the period of tooth formation, the diet is of importance to the future caries resistance of the teeth. The best known and recognized public health method of increasing caries resistance is water fluoridation. However, where the water does not contain fluoride, the dentist or pediatrician should prescribe fluoride tablets for daily use by his child patients. Also, the dentist can increase host resistance by the use of topical fluoride therapy. Fluoride-containing prophylaxis pastes, used regularly in combination with topically applied fluoride solutions such as acid fluoride phosphate, have been reported to reduce caries substantially.

Certain dentifrices and mouthwashes also have active therapeutic properties in addition to the traditionally recognized properties of making oral hygiene more effective and pleasant. Over-the-counter sales of fluoride dentifrices have greatly increased in recent years and it is reasonable to expect more effective products to be available. However, as yet, this approach to increasing the resistance to dental caries is only marginally effective.

RESTORATION OF FUNCTION

To designate restoration of function as a principle of preventive dentistry is fully justified. Until there is complete freedom from dental caries and periodontal disease, the treatment aspect of dentistry will necessarily occupy most of the dentist's time. Even if these diseases are prevented, the development and guidance of an optimally functional definition will continue to be essential to proper oral health.

C. V. Black established "extension for prevention" as a cardinal aspect of cavity preparation. Today's teachers and practitioners of operative dentistry still adhere to Black's general principles and also recognize that occlusal disharmony, missing teeth and improperly contoured restorations all predispose to the recurrence of disease. The placement of permanent restorations and prostheses now is undertaken. On the completion of this phase, the child who requires orthodontic treatment is now ready for the construction of the necessary appliances.

MAINTENANCE OF ORAL HEALTH

The preservation of a disease-free dentition is a noble challenge but, unfortunately, very few individuals can hope to remain in this pristine state of health. At present, most of the population in countries with a high standard of living and a rich diet can expect to experience some degree of dental disease.

The successful management and control of chronic dental infection is not possible without a maintenance program. To many this implies a recall system whereby patients who have been treated are checked periodically for the recurrence of dental problems. This is only a partial solution to the maintenance problem. It has already been emphasized that the control of dental disease is largely in the hands of patient or parent. Thus, at the recall visit, the patient must not only be checked for new evidence of disease but must also be stimulated to continue an effective home-care program. A demonstration of the patient's oral hygiene technique should periodically be requested and checked by means of a disclosing wafer or solution. A prophylaxis is performed for all patients, and children are given a topical fluoride treatment.

The use of so-called caries susceptibility tests can also be a useful tool during a periodic check-up. Although the actual caries susceptibility may not be revealed by any particular test, several such as the Snyder and lactobacillus tests yield some information on the dietary intake of fermentable carbohydrate.

In summary, the sequence of events as dictated by the principles of preventive dentistry are:

1. Control of disease,
2. Patient education and motivation,
3. Development of host resistance,
4. Restoration of function, and
5. Maintenance of oral health.

ADDITIONAL REFERENCE MATERIAL

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