
Commentary

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INTRODUCTION

Periodontal disease is ubiquitous, affecting 80 to 90 percent of the adult population. It may range from simple gingivitis to advanced destructive periodontitis in which there is destruction of the supporting tissues around the teeth, resulting in tooth loss.

Treatment of early, or mild, periodontal disease is usually simple, short, and successful. Treatment of advanced periodontitis, though more involved and protracted, has a high success rate. Further, treatment is based on the long-term experience of many expert clinicians and observers, supported by sound clinical research.

The criteria for a clinical investigation to be considered as having scientific merit are the following: 1) the use of reliable and standardized measurements; 2) adequate controls, particularly in clinical trials; 3) presentation of **data in a form allowing appropriate statistical analysis; and a) submission of reports to peer review**

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by publication in scientific journals. Studies not adhering to these standards are not scientifically valid, and their results must be considered anecdotal. Scheffler and Rovin's study of the Keyes technique in 18 dental practices in the Washington, D. C., area does not adhere to these standards.

However, there is in the scientific literature abundant well-documented evidence that plaque removal and subsequent control arrests or reverses gingivitis and early periodontitis. Since the Keyes technique relies principally on plaque removal and control, it is not a new technique at all, for plaque removal and control are exactly what all dentists who treat periodontal disease do as the initial and basic part of their therapy.

For hundreds of years, periodontal treatment has been based on the removal of hard and soft deposits from tooth surfaces. This therapy **has** been quite effective. However, cases of advanced periodontal disease may require the use of surgical procedures for the proper debridement of inaccessible microbial masses and calculus. The depths of periodontal pockets or other difficult to reach places cannot be thoroughly cleansed unless exposed surgically. Indeed, root surfaces with periodontal pockets deeper than 5 mm may still harbor significant numbers of micro-organisms despite careful scaling by skilled operators (12). A further beneficial effect of the surgical approach may be to reduce pocket depth, thus making formerly inaccessible areas accessible for the patient to exercise plaque control.

A study of the result of conventional therapy was reported by Hirschfeld and Wasserman in 1978 (1). **This study involved 600 patients, most of whom had advanced periodontal disease. All these patients had been referred to a periodontal specialist for care because they were in imminent danger of losing teeth. All 600 received conventional periodontal treatment, which for many included surgery when indicated; and all then had followup care for 15 to 50 years (with a mean duration of observation of 22 years). Eighty-three percent of these patients lost only 0 to 3 teeth. The fact that these patients with advanced disease lost so few teeth during that long time span demonstrates the success of conventional periodontal therapy. However, a small subgroup of 25 patients (4.2 percent) in this study lost more than 10 teeth in the 22-year followup period. Recent evidence from other studies suggest that this subgroup of patients probably had a more aggressive or rapidly progressing form of adult periodontitis.**

It should be noted that the Hirschfeld and Wasserman study did not include patients with simple gingivitis or early periodontitis; the study examined only the results of conventional treatment of patients with advanced periodontal disease. No similar conclusions regarding the effectiveness of the Keyes technique in the treatment of advanced periodontal disease can be drawn from the study by Scheffler and Rovin for two reasons. One, the authors provide no useful information indicating the severity of the patients' disease, and two, their study is of such short duration that it is valueless for judging the long-term effect of the Keyes technique on advanced periodontal disease.

There are other careful long-term studies which have demonstrated the long-term success of conventional treatment: Ramjford, et al. (7), Knowles, et al. (3), Lindhe and Nyman (4), and Nyman and Lindhe (6). These studies followed the patients for periods of time up to 10 years after treatment. Treatment was careful preparation of the patient by scaling, plus motivation and training in oral hygiene. Surgery was indicated because of the severity of the patients' periodontal disease.

All of these studies constitute strong evidence that conventional periodontal therapy, including surgery and proper maintenance by the dentist and the patient, can stop the progress of advanced periodontal destruction and maintain the dentition in the majority of cases.

When comparing these well-designed studies of conventional treatment that have been reported in the scientific literature to the study of the Keyes technique by Scheffler and Rovin, one must point out that the Keyes technique involves the same antimicrobial approach as conventional therapy. However, Keyes only rarely accepts the use of surgery to gain access to more deeply involved areas. His method is to flush such areas with salt solutions, which, he states, is sufficient to kill pathogenic bacteria. Whether salt solutions actually achieve this goal is not clear at this time. Thus, it is premature to suggest that this treatment regimen alone should be used in human patients as a replacement for techniques that have been documented to control periodontal diseases.

DIAGNOSIS OF PERIODONTAL DISEASE AND MONITORING OF DISEASE ACTIVITY

The Keyes technique employs a diagnostic test that has not yet been validated as a measure of disease activity, namely, phase-microscopic examination of wet samples of material scooped out of periodontal pockets. Implicit in reliance on this test are at least two unproved assump-

tions: 1) that the microbiologic samples taken are representative of the microbiota (bacterial population) in the worst-diseased sites, and 2) that the test is diagnostic of disease activity and can also be used to monitor the effects of treatment.

Are the Samples Representative?

The basis of choosing the sites for sampling of subgingival plaque has not been clearly defined by Keyes, apart from a statement that “particular effort is made to obtain samples from deeper subgingival spaces that are difficult for the patient to clear (sic)” (2). That the samples are representative is an unwarranted assumption, because there is a dramatic variation in the bacterial population from site to site within the same individual, from supragingival (above the gum margin) sites to subgingival (below the gum margin) sites, from diseased sites to healthy sites, and between sites with different forms of periodontal disease (5,8,9,10). Therefore, there is no basis for using a sample of bacteria from one area as an indication of the bacterial population of the plaque from a patient’s mouth.

Is the Test Diagnostic of Disease Activity?

Any proposed diagnostic test must be validated. The one used in the Keyes technique has not been. Keyes’ claim that the state of disease activity can be determined by examining the

proportion of motile forms on a microscopic slide is not substantiated by scientific evidence. Research on the possible existence of such a relationship is just now being invited in a “Request for Proposals” issued by the National Institutes of Health (RFP No. NIH-NIDR-81- 3R).

However, there is at this time a limited amount of established knowledge about the relationship of motile organisms and periodontal disease. That phase microscopy could be sensitive to all forms of active periodontal destruction is doubtful. For example, in the case of periodontitis, an actively progressive periodontal disease that causes major destruction of bone surrounding the teeth in young individuals, there are few motile organisms even though the disease is progressing at a rate generally considered to be much faster than that of adult periodontitis. The organism that has been shown to be uniquely and closely associated with this condition is not motile.

Thus, it seems clear that to date there is no convincing rationale for the use of phase microscopy for either of the two uses suggested by Keyes.

THE USE OF SALT, HYDROGEN PEROXIDE, SODIUM BICARBONATE, AND TETRACYCLINE AS THERAPEUTIC AGENTS IN THE CONTROL OF PERIODONTAL DISEASE AND THE USE OF PHASE MICROSCOPY AS A PATIENT MOTIVATOR

A widespread group of therapeutic modalities is employed in the Keyes technique. One modality is scaling, which as stated above has been shown to be effective in controlling periodontal disease. In addition, Keyes advocates local applications of concentrated salt solutions and/or pastes of sodium chloride, magnesium chloride, hydrogen peroxide, and often the systemic administration of tetracycline (an antibiotic) under certain conditions. At present, tetracycline has been shown to be needed in only a small number of cases which responded poorly to routine therapy. The use of this drug in about half of the patients treated by the Keyes followers in Scheffler and Rovin’s Washington area study is totally

unjustified. Furthermore, no evidence is available which suggests that the local applications of salt solutions or pastes or hydrogen peroxide reduce the rate of periodontal destruction, prevent the recurrence of active periodontal lesions in a treated patient, or add anything to the existing regime of periodontal therapy.

Keyes and followers assert that phase microscopy has value in motivating a patient to perform proper oral hygiene. This assertion is based on the assumption that patients are more willing to follow the dentist’s directions to clean their mouths properly when shown the living bacteria which can be scraped off their teeth.

However, the American Society of Preventive Dentistry, which in the 1960's spearheaded an effort to use phase microscopy to motivate pa-

tients, found that the technique does not provide a better approach to patient motivation than traditional modes of hygiene instruction.

ECONOMIC PERSPECTIVES

CBAS and CEAS of medical-dental procedures are essentially accounting procedures carried out to determine if a given program, or in this case a treatment regimen, is worth the effort. These analytic techniques have become increasingly sophisticated in the last 5 years (11,13). CBA relates the total costs of receiving such treatment to the total benefits, while CEA compares the costs of one treatment modality to those of another, or to a group of alternative treatments, having established that all of the treatments meet a minimum acceptable level of effectiveness.

Scheffler and Rovin do not present a complete picture of costs and benefits nor of the costs of alternative treatments. Although they discuss alternative surgical and nonsurgical techniques, they do not present the types of data necessary to compare these alternatives with the Keyes technique.

The only costs that Scheffler and Rovin present are certain average variable labor and

capital costs of dental office visits. Even these figures are inconclusive. The authors' data are not clear and do not specify whether all of the dentists were providing the same mix of dental services. Their cost estimates might differ considerably if periodontists or general practitioners proficient in periodontal surgery were included in the data sample.

A more glaring deficiency, which the authors have acknowledged by disclaimer, is the lack of any estimates of patient opportunity costs, both in the dental office visits and in home oral hygiene. Generally speaking, patient opportunity costs would capture the value of resources consumed by the patient in addition to dental office charges. These costs would include transportation costs to visit the dentist, time spent in home oral hygiene, etc. They would also include dentist opportunity costs, e.g., the cost of training personnel to carry out the Keyes regimen.

SUMMARY

Researchers can point to mounting evidence that dentistry is gaining the scientific knowledge that will provide the public some measures for the prevention and management of periodontal disease. Dentistry has repeatedly demonstrated its willingness to support major public health efforts. Dental researchers and practitioners have actively participated in the development of the scientific base, clinical applications, and promotion of measures to control dental caries through the use of fluoride and, more recently, sealants. Now the dental research community is seeking to conquer caries totally by developing a caries vaccine. Research towards this goal is being carried out at a number of research

centers, supported cooperatively by universities and the National Institutes of Health.

While our scientific knowledge base for periodontal disease may lag behind that for caries, significant advances have been made in the last decade and a half by a diverse and dedicated group of scientists and concerned clinicians.

We understand and sympathize with the goal of Dr. Keyes and coworkers as well as Drs. Scheffler and Rovin to provide better, simpler and less expensive therapy to all periodontal patients, because this is a goal shared by all individuals in periodontal research. However, the standard for acceptance of therapy cannot

become enthusiastic advocacy, popular appeal, and press releases, but must be carefully controlled clinical and laboratory testing. Accept-

ance of the former as standards would be as a sharp step backward for the dental profession and for the public.

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