

PERIODONTICS: A GUIDE TO PROGNOSIS

Prognosis should be regarded as a dynamic parameter, and every treatment plan should allow for specific intervals to re-evaluate the patient's status

Prognosis (derived from the Greek "pro" meaning prior and "gnosis" meaning knowledge) has been defined as a "prediction as to the probable course and outcome of a disease, injury, or developmental abnormality in a patient, based on general knowledge of such conditions, as well as on specific information and exercise of clinical judgement in the particular case."

Our fundamental objective in dentistry, of preserving the dentition in health for a lifetime, may be influenced by various desires and needs of the patient and therapist. The prognosis, or prediction as to the outcome of a given dental situation, must therefore be related to that particular set of goals or objectives to which the patient and therapist aspire. The patient illustrated in Figures 1 and 2 has some severe dental problems. The prognosis for keeping every single tooth for this patient is very poor; however the prognosis for this dentition is greatly enhanced if we concede the loss of several teeth and work towards a different objective with fewer teeth and a less crowded dentition.

In addition to relating prognosis to treatment objectives, one should also relate prognosis to a particular time frame. Patients want to know, how long will it last? Most practitioners wisely refrain from guaranteeing the longevity of dentition, but in all fairness to the patient we must provide some indication of the likelihood of success or failure of treatment. Each practitioner must define his terms of reference in conveying his prognosis or prediction. Further guidelines in this regard will be discussed below.

Prognosis should be regarded as a dynamic

parameter. The prognosis may vary during the course of therapy. Every treatment plan should allow for specific intervals to re-evaluate the patient's status. Our prediction for success may be enhanced as we see a patient's oral hygiene efforts improve or as a potentially difficult endodontic case is successfully completed. The prognosis may take a turn for the worse if for example a developmental groove or a vertical root fracture is revealed during a caries control procedure (Fig 3). The therapist must continually assess the prognosis and use this information to guide his therapeutic approach.

The overall prognosis is formulated from the collective prognosis of individual teeth, however the prognosis of certain strategic teeth may have significantly more influence on the overall prognosis than other individual teeth. Determining a prognosis may be compared to balancing a scale: one must weigh the positive factors against the negative (Fig 4).

Many different parameters may affect the prognosis and these may be categorized into two groups: factors related to the ability to restore and maintain health, and factors related to functional demands.

A. FACTORS RELATED TO THE ABILITY TO RESTORE AND MAINTAIN HEALTH 1. General Medical Status

It is generally easier to treat periodontal problems that are caused by local factors (plaque and calculus) when compared to problems that are related to systemic factors. A compromised medical status has a negative influence on the dental prognosis in direct ways (physiologic healing) and indirect

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1. Due to severe crowding, the prognosis for keeping every tooth is poor in this dentition



2. The prognosis improves however, if we concede the loss of several teeth and work toward a different objective with fewer teeth and less crowding



3. Palatal developmental groove complicates caries and periodontal control

ways (behavioral and physical approaches to oral hygiene).

2. Host Resistance - Immune System

Clearly a compromise in the host defence system adversely affects the prognosis. The literature is replete with studies demonstrating the role of neutrophil chemotaxis and phagocytosis (or consequences of diminished neutrophil function) in modulating the course of periodontal diseases.² A documented rapid rate of bone loss suggests either a diminished host defence system or an enhanced pathogen, or some combination of the two that casts a poor prognosis regardless of the absolute quantity of bone loss. In some cases, the patient's age may be used to gauge the integrity of the host resistance without the benefit of documentation of bone loss.

3. Root (and Furcation) Anatomy

Deep concavities in the root surface and narrow furcation areas can impede calculus and plaque removal (Figs 5,6).

4. Regional Anatomy

Proximity of the maxillary sinus, mental foramen, mandibular tori or a shallow vestibule may affect the therapist's ability to provide treatment.

5. Extent of Periodontal and Caries Destruction

a) Quantity of Alveolar Bone Loss

Clearly the more bone lost the poorer the prognosis. (See below section B/4 for relationship to functional demands.)

b) Morphology of the Osseous Deformity

The most important factor in the prognosis of an individual tooth is the topography of the surrounding bone. A tooth with 50 percent horizontal bone loss may have a better long-term prognosis than a tooth with 30 percent bone loss expressed as a localized deep and wide infrabony defect (Fig 7).

c) Pocket Depth

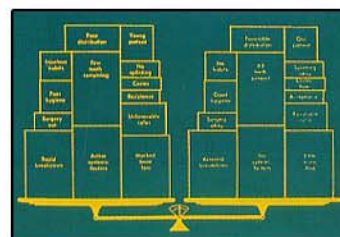
The deeper the pocket depth, the more difficult it is for both patient and therapist to adequately achieve plaque and calculus removal. Several studies have demonstrated the difficulty, even by very experienced therapists, of achieving complete calculus removal in pockets deeper than 4 to 5 mm.⁵ Recognition of the limitations of scaling and root planing in deep pockets can guide the therapist in selecting the appropriate procedures for calculus removal and subsequent periodontal maintenance.

d) Extent of Caries Destruction

A determination must be made as to whether sufficient crown and/or root structure remains for adequate restoration. If surgical clinical crown lengthening procedures are required, the potential negative effect of osseous recontouring procedures on adjacent teeth must be assessed as well as the possible exposure of root furcation areas.^{8,9,10}

e) Pulpal Involvement

Advances in endodontic therapy now allow for success rates of over 95 percent, however anomalies in root canal anatomy, accessory canals, and combined endodontic-periodontal lesions may compromise prognosis.



4. Prognosis is determined by weighing the positive factors against the negative to arrive at a prediction for success



5. A deep and narrow root concavity predisposes to severe bone loss



6. Radiographic view of tooth in Fig 5 shows combined periodontic-endodontic lesion



7. A deep wide osseous defect not amendable through definitive periodontal therapy renders a poor prognosis for this first molar

6. Knowledge and Ability of the Therapist

It is important for the therapist to recognize his or her limitations and to seek appropriate consultations or refer patients when indicated.

7. Patient Compliance, Attitude Toward Therapy and Perceived Value of the Natural Dentition

This factor critically influences prognosis. A well-motivated patient is a most valued asset in successful therapy. The patient's compliance with oral hygiene efforts is a *sine qua non* for success.^{6,9}

8. Effectiveness of the Periodontal Maintenance Program

It may seem unusual to include a post-treatment procedure as a factor influencing prognosis, but several studies^{6,9} have suggested that the effectiveness of the periodontal maintenance program may be the most critical factor in assuring success over the long term.

B. FACTORS RELATED TO FUNCTIONAL DEMANDS

1. Number of Remaining Teeth

The more teeth remaining, the greater the ability to share occlusal forces, thus reducing the load on an individual tooth.

2. Tooth Position and Occlusal Relationships

If a tooth is severely tipped, occlusal forces are not directed parallel to the long axis of the tooth, thus somewhat compromising its ability to withstand occlusal loading in function.

The position of a tooth within the arch significantly influences restorative treatment planning. Many a qualified restorative dentist has been heard to say, give me two good cuspids and two good molars and I can restore the full arch. This statement is not unreasonable if other factors are suitable. This same statement however can not be made if the four remaining teeth in an arch are the incisor teeth.

3. Parafunctional Habits

The stress of modern society can exert significant deleterious influences on the dentition by means of parafunctional habits (clenching, bruxism, factitial habits etc.). Heavy occlusal loading to teeth, which may have diminished osseous support, can notably increase tooth mobility. TMJ dysfunction and excessive occlusal wear may also be sequelae to parafunction.

4. Clinical Crown to Root Ratio

The clinical crown-to-root ratio determines the mechanical advantage or disadvantage of the root by shifting the fulcrum point. As the clinical crown: root ratio exceeds 1:1, the ability of the tooth to withstand horizontal forces decreases.

5. Tooth Mobility

It is important to establish whether existing tooth mobility is stable, which implies that some degree of equilibrium has been achieved, or whether mobility is increasing over time. Patients often tell us that teeth have been loose for many years but they are still functioning well and are not getting any looser. These teeth may remain loose for many more years but still remain in function.

Range of Prognosis: A Definition of Terms

Descriptive terms for prognosis include: hopeless, poor, questionable, doubtful, guarded, fair, good, very good, excellent. The criteria for using any of these terms must be clear to the prognostician and must be readily communicated to the patient and other therapists. It is recommended to proceed initially on a tooth-by-tooth basis in assessing prognosis; then one can formulate a prognosis for the entire arch.

The basic determination in establishing prognosis is whether or not the tooth or arch can be kept healthy and functional, and for how long. Many therapists discuss prognosis in five-year intervals (ie. "The five-year prognosis is good and the 10-year prognosis is fair"). This means that we are making an educated guess as to the probability of a five- or 10-year survival with respect to our established treatment objectives.

A narrow range of terms in describing prognosis allows for easier understanding and communication for concerned parties. A good prognosis, related to a time interval (eg. five years), simply means that there is a good probability of maintaining health and function for that time period. A poor prognosis means the opposite is true. A questionable or guarded prognosis means that there are factors involved preventing complete control of a tooth or arch and that there

is an element of doubt in the prediction of success or failure. It is better to admit doubt than to mislead the patient.

In order to enhance one's prognostic skills, one must continuously make a conscious effort to evaluate the patient's progress over the years and to analyze those factors which have influenced success or failure in therapy. It is also significant to note that simply because the preservation of the dentition may have been achieved, it is not a testament that the optimum therapy was performed. There may have been a better means to the same end.

TABLE 1 — FACTORS INFLUENCING PROGNOSIS

A - Factors related to the ability to restore and maintain health

1. General medical status
2. Host resistance - immune system
3. Root anatomy
4. Regional anatomy
5. Extent of periodontal and caries destruction:
 - a) quantity of alveolar bone loss
 - b) morphology of the osseous defect
 - c) pocket depth
 - e) pulpal involvement
6. Knowledge and ability of therapist
7. Patient attitude and compliance
8. Effectiveness of the periodontal maintenance program.

B - Factors Related to Functional Demands

1. Number of remaining teeth
2. Tooth position and occlusal relationship
3. Parafunctional habits
4. Crown to root ratio
5. Mobility

TABLE 2 — PROGNOSIS Guarded

- up to 50% attachment loss
- 6-8 mm pocket depth
- Class II furcation invasion

- Grade II mobility
- root proximity with moderate attachment loss

Poor

- greater than 75% loss of attachment
- greater than 8 mm pocket depth
- Class III furcation invasion or furcation invasion on a maxillary first bicuspid
- Grade III mobility
- repeated periodontal abscess
- extensive developmental groove.

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