Determination of Prognosis

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Definitions

A prognosis is a prediction of the probable course, duration, and outcome of a disease based on general knowledge of the pathogenesis of the disease and the presence of risk factors for the disease. The diagnosis is made before the treatment plan is established.

The prognosis is based on **specific information about the disease** and **how it can be treated**, but it also can be influenced by the **clinician's previous experience** with treatment outcomes (successes and failures) as they relate **to the particular case**. It is important to note that the determination of prognosis is a dynamic process.

Risk generally deals with the likelihood of an individual developing a disease in a specified period.

Risk factors are characteristics that put an individual at increased risk for developing a disease.

Prognostic factors are characteristics that predict the outcome once the disease is present. In some cases, risk factors and prognostic factors are the same. For example, patients with diabetes or patients who smoke are more at risk for acquiring periodontal disease.

Types of Prognosis

Prognosis classifications(Kwok and Caton) depend on "t**he probability of obtaining the stability of the periodontal supporting apparatus."** This scheme is based on the probability of disease progression as related to local and systemic factors

Favorable prognosis: Comprehensive periodontal treatment and maintenance will stabilize the status of the tooth. Future loss of periodontal support is unlikely.

Questionable prognosis: Local or systemic factors influencing the periodontal status of the tooth may or may not be controllable.

If controlled, the periodontal status can be stabilized with comprehensive periodontal treatment. If not, future periodontal breakdown may occur.

Unfavorable prognosis: Local or systemic factors influencing the periodontal status cannot be controlled. Comprehensive periodontal treatment and maintenance are unlikely to prevent future periodontal breakdown.

Hopeless prognosis*:* The tooth must be extracted.

In many of these cases, it may be advisable to establish a *provisional prognosis* until phase I therapy is completed and evaluated.

Overall Versus Individual Tooth Prognosis

Prognosis can be divided into **overall prognosis and individual tooth prognosis**. The *overall prognosis* is concerned with dentition as a whole.

. The overall prognosis answers the following questions:

• Should treatment be undertaken?
• Is treatment likely to succeed?
• When prosthetic replacements are needed, are the remaining teeth able to support the added load of the prosthesis?

The *individual tooth prognosis* is determined after the overall prognosis and is affected by it.

Factors in Determination of Prognosis

Overall Clinical Factors
Patient age
Disease severity
Biofilm control
Patient compliance

Systemic and Environmental Factors
Smoking
Systemic disease or condition
Genetic factors
Stress

Local Factors
Biofilm and calculus
Subgingival restorations

Anatomic Factors
Short, tapered roots
Cervical enamel projections
Enamel pearls
Bifurcation ridges
Root concavities
Developmental grooves
Root proximity
Furcation invasion
Tooth mobility
Caries
Tooth vitality
Root resorption

Prosthetic and Restorative Factors
Abutment selection

Overall Clinical Factors

Patient Age

- When two patients have similar levels of **connective tissue attachment and alveolar bone loss**, the **older patient generally has a better prognosis**.
- In younger patients, periodontal destruction occurs over a **shorter time**, indicating possible **aggressive periodontitis** or risk factors like **systemic disease or smoking**.
- Although younger patients typically have a **greater capacity for tissue repair**, rapid destruction often **exceeds the body's natural healing ability**.
- **Age alone is not a definitive factor** in prognosis; it must be assessed alongside **overall health, smoking habits, and treatment adherence** to determine disease progression and treatment outcomes.

Disease Severity

1. Importance of Patient History

- A patient's history of periodontal disease helps predict future susceptibility to tissue breakdown.
- The main factors to assess are **probing pocket depth, clinical attachment loss, bone loss, and type of bony defect**, which are evaluated both clinically and radiographically.
- **Clinical attachment loss** is a better indicator than probing depth because it directly reflects the extent of periodontal destruction.
- A tooth with **deep pockets but minimal attachment and bone loss** has a better prognosis than one with **shallow pockets but severe attachment and bone loss**.
- **Apical disease (due to endodontic infection)** further worsens the prognosis.

2. Bone Assessment & Tooth Support

- The prognosis depends on **how much bone remains to support the teeth**:
  - If **bone loss is minimal**, the teeth remain stable.
  - If **bone loss is severe**, the teeth may lack sufficient support.
- Even if bone loss is stopped through treatment, the remaining bone must be enough to support chewing forces.

3. Impact of Bone Defect Type

- **Horizontal bone loss**: The prognosis depends on the remaining bone height

because regeneration is difficult.

- **Intrabony (vertical) defects**: If the defect has favorable

shape and enough surrounding bone walls, there is a

high chance for bone regeneration.

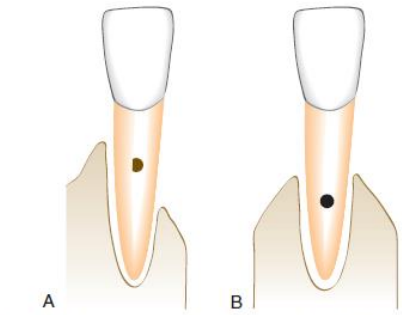


Fig. 35.3 Prognosis for tooth A is better than for tooth B, despite less bone on one of the surfaces of A. Because the center of rotation of tooth A is closer to the crown, the distribution of occlusal forces to the periodontium is more favorable than in B.

- When greater bone loss has occurred on one surface of a too
involved surfaces should be considered when determining
greater height of bone on other surfaces, the centre of rotation of the tooth will be nearer the crown. This results in a more favorable distribution of forces to the periodontium and less tooth mobility

4. Strategic Extraction & Treatment Planning

- In some cases, **extracting a tooth with a poor prognosis** can improve the condition of adjacent teeth and benefit the overall treatment plan.
- If a questionable tooth is left untreated for too long, **the surrounding bone may deteriorate to a point where dental implants are no longer an option**.
- The decision should weigh **periodontal therapy and maintenance** against **early extraction and implant placement** to achieve the best long-term outcome.

Biofilm Control

Bacterial biofilm is the primary etiologic factor associated with periodontal disease. Therefore effective removal of biofilm daily by the patient is critical to the success of periodontal therapy and the prognosis.

Patient Compliance and Cooperation

The prognosis for patients with gingival and periodontal disease is critically dependent on the patient's attitude, desire to retain the natural teeth, and willingness and ability to effectively control biofilm.

Systemic and Environmental Factors

Smoking

- **Smoking is a major environmental risk factor** for periodontal disease, affecting both its development and progression.
- It **increases disease severity** and **impairs healing**, leading to a **questionable prognosis** in mild to moderate periodontitis and an **unfavorable or hopeless prognosis** in severe cases.
- **Quitting smoking improves prognosis**, making it **favorable** for mild to moderate cases and **questionable** for severe cases.

Systemic Disease or Condition

The patient's systemic background affects the overall prognosis in several ways. For example

the prevalence and severity of chronic periodontitis are significantly higher in patients with poorly controlled diabetes than in those whose diabetes is well controlled or those who do not have diabetes

It follows that the prognosis in these cases depends on patient compliance relative to both medical and dental status. Patients with well-controlled diabetes and slight to moderate

periodontitis who follow their recommended periodontal treatment should have a favorable prognosis. Similarly, in patients with other systemic disorders that could affect disease progression, the prognosis improves with the correction of the systemic problem.
The prognosis is questionable when surgical periodontal treatment is required but cannot be provided because of the patient's health.

Genetic Factors

Periodontal diseases represent a complex interaction between a microbial challenge and the host's response to that challenge, both of which may be influenced by environmental factors such as smoking. In addition to these external factors, evidence also indicates that genetic factors may play an important role in determining the nature of the host response.

Stress

Physical and emotional stress, as well as substance abuse, may alter the patient's ability to respond to the periodontal treatment performed. These factors must be realistically faced when attempting to establish a prognosis.

Local Factors

Biofilm and Calculus

- **Primary Cause of Periodontal Disease:** Bacterial biofilm and calculus are the **main local factors** contributing to periodontal disease.
- **Prognosis:**
  - A **favorable prognosis** depends on effective biofilm and calculus removal by both the **patient (oral hygiene)** and **clinician (professional scaling and root planing).**
  - Inadequate removal leads to **persistent inflammation** and **disease progression**.

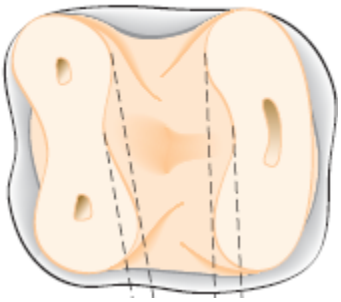
Subgingival Restorations

- **Effects:**
  - **Subgingival margins** facilitate **biofilm retention, increased inflammation, and bone loss**, especially when there are **overhanging margins or contour discrepancies**.
- **Prognostic Impact:**
  - The **larger and more prolonged** the discrepancy, the **poorer the prognosis**.
  - **Supragingival margins** are **less likely** to contribute to periodontal destruction and are associated with a **better prognosis**

Anatomic Factors

Anatomic factors that may predispose the periodontium to disease and therefore affect the prognosis include.

- **Short, tapered roots with large crowns** → Less favorable prognosis due to. Disproportionate crown-to-root ratio and the reduced root surface available for periodontal support, the periodontium may be more susceptible to injury by occlusal forces.
- **Cervical enamel projections (CEPs) & enamel pearls** → ectopic extensions of enamel that extend beyond the normal contours of the cementoenamel junction found in molars, **Enamel pearls** are larger, round deposits of enamel that can be located in furcations or other areas on the root surface these interfere with attachment and may limit regenerative treatment success.
- **Intermediate bifurcation ridge**



is present in **73% of mandibular first molars**, extending between the mesial and distal roots at the furcation midpoi

The presence of these enamel projections on the root surfac interferes with the attachment apparatus and may prevent regenerative procedures from achieving their maximum potential. Therefore their presence may have a negative effect on the prognosis of an individual tooth. .

- **Root concavities** → Common in molars and premolars, they increase the surface area that may be more resistant to torquing forces, they also create areas that can be difficult for both the dentist and the patient to clean.
- **Developmental grooves & root proximity** →

Often seen in maxillary lateral and mandibular incisors, they form plaque-retentive areas that are hard to access.

- **Furcation involvement** → Difficult access reduces prognosis(In 58% of maxillary and mandibular first molars, the furcation entrance diameter is narrower than the width of conventional periodontal curette) especially in maxillary first premolars. Resecting a buccal root in maxillary molars may improve outcomes.

Scaling with root planing is a fundamental procedure in periodontal therapy. Anatomic factors that decrease the efficiency of this procedure can have a negative impact on the prognosis.

Tooth Mobility

- **Causes:**
  1. **Loss of alveolar bone** (irreversible).
  2. **Inflammation** in the periodontium (potentially reversible).
  3. **Trauma from occlusion** (can often be corrected).
- **Prognostic Implications:**
  - Mobility due to **inflammation or occlusal trauma** can be managed, improving prognosis.
  - Mobility due to **alveolar bone loss** is usually irreversible, and the prognosis worsens as bone loss increases.
  - Depending on severity, mobility can classify a tooth as **questionable, unfavorable, or hopeless**.
  - Eliminating the cause of mobility can stabilize a tooth and improve its prognosis.

Caries, Tooth Vitality, and Root Resorption

- **Extensive caries:** The prognosis depends on the feasibility of **restoration and endodontic treatment** before periodontal therapy.
- **Root resorption:**
  - **Idiopathic or orthodontic-induced resorption** can compromise **tooth stability** and negatively impact periodontal treatment outcomes.
- **Tooth vitality:**
  - The **prognosis of treated nonvital teeth is comparable to that of vital teeth**.
  - **New attachment** can occur on both **vital and nonvital** teeth if periodontal conditions allow.

Prosthetic and Restorative Factors

- The prognosis depends on **bone levels (seen in X-rays)** and **attachment levels (checked clinically)** to decide if enough teeth can be saved for function and aesthetics or to support a prosthesis.
- The overall prognosis and individual tooth prognosis overlap because the prognosis for key individual teeth may affect the overall prognosis for prosthetic rehabilitation. For example, saving or losing a key tooth may determine whether other teeth are saved or extracted or whether the prosthesis is fixed or removable.
- **Endodontically treated teeth** (with posts) are **more likely to fracture**, especially if used to support a removable partial denture. Special oral hygiene is required for these teeth.

Prognosis of Specific Periodontal Diseases

Prognosis for Patients with Gingival Disease

1. **Biofilm-Induced Gingivitis**
    - **Gingivitis from Dental Plaque**: **Reversible** with proper oral hygiene and removal of biofilm and irritants. Gingival contours conducive to the preservation of health are attained, Prognosis is **favorable** if maintained.

1. **Gingivitis Affected by Systemic Factors**: .The inflammatory response to bacterial biofilms at the gingival margin can be influenced by systemic factors, such as endocrine-related changes associated with puberty, menstruation, pregnancy, and diabetes, and the presence of blood dyscrasias. The prognosis depends on **controlling both biofilm and systemic factors**.

2. **Drug-Influenced Gingival Enlargement**
    - Gingival diseases associated with medications include Caused by **phenytoin, cyclosporine, nifedipine**, and **oral contraceptives**.
    - Eliminating the source of inflammation, either trauma or biofilm, can limit the severity of the gingival overgrowth. However, surgical intervention is usually necessary to correct the alterations in gingival contour.
    - If the medication continues, **enlargement may recur**, making the prognosis dependent on **alternative treatment options**.
    - Therefore the long-term prognosis depends on whether the aetiology of the inflammation can be eliminated or the patient's systemic problem can be treated with an alternative medication that does not have gingival enlargement as a side effect.
3. **Non–Biofilm-Induced Gingival Disease**
    - caused by **bacterial, viral, or fungal infections or allergic reactions**.
    - Because gingivitis in these patients is not usually attributed to biofilm accumulation. The prognosis depends on **eliminating the underlying infection or irritant**.(bacterial, fungal, or viral infection, allergic, toxic, and foreign body reactions, as well as mechanical and thermal trauma)

The prognosis for Patients With Periodontitis

Periodontitis

- **Periodontitis** is a **slowly progressing disease** influenced by local environmental factors.

- It can be **localized** or **generalized**, with prognosis depending on disease severity and patient compliance.
- **Mild to moderate cases** (minimal attachment and bone loss) has a **favorable prognosis** if inflammation is controlled through **good oral hygiene and removal of biofilm-retentive factors**
- **Severe cases** (furcation involvement, tooth mobility) have a **questionable to poor prognosis**, especially if:

  - **Oral hygiene compliance is poor**
  - **Disease progression is unchecked**

- In advanced stages, the prognosis may become **hopeless**, requiring extraction.

Periodontitis as a Manifestation of Systemic Diseases

- **Bacterial plaque** is the primary cause of periodontal disease, but **systemic diseases** affecting the host response can influence **disease progression and prognosis**.
- **Genetic disorders**, such as **leukocyte adhesion deficiency (LAD) syndrome**, impair immune function, increasing susceptibility to periodontitis, These conditions often appear **early in life**, leading to **severe periodontal destruction**
- **Prognosis** in such cases is generally **questionable to unfavorable**, depending on disease severity and host immune response.

Necrotizing Periodontal Disease

Necrotizing Periodontal Diseases

1. **Necrotizing Ulcerative Gingivitis (NUG)**
   - A bacterial plaque-induced disease exacerbated by **secondary factors** such as **psychological stress, smoking, and poor nutrition**, which contribute to **immune suppression**.
   - It presents with **painful, necrotic lesions**, gingival bleeding, and ulceration.
   - With **effective plaque control** and management of secondary factors, the **prognosis is favorable**.
   - However, **tissue destruction is irreversible**, and failure to control risk factors increases the likelihood of **recurrence**, making the long-term prognosis **questionable**.
2. **Necrotizing Ulcerative Periodontitis (NUP)**
   - A more severe form affecting **deeper periodontal tissues**, affecting **connective tissue attachment and alveolar bone loss**.

- It can develop in **systemically healthy patients** following recurrent NUG episodes or as a complication of **preexisting periodontitis**.
- In **immunocompromised patients** (e.g., **HIV, severe malnutrition, or systemic diseases**), NUP progression is more aggressive.
- Prognosis depends on **controlling local and systemic factors**:
  - In **healthy individuals**, the focus is on **biofilm and risk factor management**, which may improve the prognosis.
  - In **immunocompromised patients**, the prognosis is **less predictable** and depends on **stabilizing the underlying systemic condition** in addition to periodontal treatment.

Determination and Reassessment of Prognosis

Determination and Reassessment of Prognosis in Periodontal Disease

1. **Importance of Accurate Diagnosis:**
   - Prognosis assessment depends on evaluating the severity and extent of the disease.
   - Patient response to treatment varies based on multiple factors, including the type of treatment, clinician expertise, and patient oral hygiene.
2. **Prognosis in Advanced Cases:**
   - When teeth become non-functional or untreatable, extraction is the only option.
   - The ability to save a tooth depends on the clinician's skill and the patient's commitment to oral care.
3. **Changes in Prognosis During Treatment:**
   - Initial evaluation may not fully reveal bone loss until further treatment, such as scaling or surgical intervention, is performed.
   - Prognosis may improve if the patient responds well to treatment or worsen if inflammation persists.
4. **Factors Influencing Patient Response:**
   - Reduction in pocket depth and inflammation after treatment suggests a better prognosis.
   - Uncontrolled inflammation despite treatment indicates a poor prognosis.
   - Systemic conditions like diabetes and smoking significantly impact treatment success.
5. **Nature of Periodontal Disease Progression:**
   - Periodontitis progresses in episodic phases, alternating between stability and destruction.
   - It is difficult to determine whether a lesion is in remission or active progression.
   - Regular reassessment is necessary to monitor disease progression and adjust treatment accordingly.