Complete Summary

GUIDELINE TITLE

HealthPartners Dental Group and Clinics guidelines for the diagnosis and treatment of periodontal diseases.

BIBLIOGRAPHIC SOURCE(S)

HealthPartners Dental Group and Clinics guidelines for the diagnosis and treatment of periodontal diseases. Minneapolis (MN): HealthPartners; 2006 Mar 9. 85 p.

GUIDELINE STATUS

This is the current release of the guideline.

** REGULATORY ALERT **

FDA WARNING/REGULATORY ALERT

Note from the National Guideline Clearinghouse (NGC): This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- July 08, 2008, Fluoroquinolones (ciprofloxacin, norfloxacin, ofloxacin, levofloxacin, moxifloxacin, gemifloxacin): A BOXED WARNING and Medication Guide are to be added to the prescribing information to strengthen existing warnings about the increased risk of developing tendinitis and tendon rupture in patients taking fluoroquinolones for systemic use.

COMPLETE SUMMARY CONTENT

SCOPE

DISEASE/CONDITION(S)

Periodontal diseases:

- Gingivitis
- Chronic adult periodontal disease
- Refractory periodontitis
- Early onset periodontal disease
- Tooth recession
- Inadequacy of attached gingiva
- Root exposure
- Peri-implant disease

GUIDELINE CATEGORY

Diagnosis
Evaluation
Management
Treatment

CLINICAL SPECIALTY

Dentistry

INTENDED USERS

Dentists

GUIDELINE OBJECTIVE(S)

To provide the HealthPartners Dental Group dental care staff with diagnostic and treatment algorithms for the various periodontal diseases that emphasize patient and staff education, appropriate treatment modalities, and guidance for periodontal referrals resulting in better, more uniform care for this patient population

TARGET POPULATION

Adult and pediatric patients in the HealthPartners Dental Group

INTERVENTIONS AND PRACTICES CONSIDERED

Diagnosis/Evaluation

1. Periodontal screening for signs of active disease
2. Evaluation and periodontal examination
    - Radiographs (bite wings, full-mouth, panographic)
    - Visual exam

- Plaque and calculus assessment
- Periodontal charting

3. Maintenance of periodontal records
4. Evaluation of systemic conditions (e.g., diabetes, smoking, pregnancy)
5. Bacterial DNA testing or cultural analysis

Treatment/Management

1. Plaque control
2. Oral hygiene instruction
3. Referral for systemic conditions (e.g., diabetes, smoking, pregnancy)
4. Compromise therapy
   - Antimicrobial rinses (e.g., chlorhexidine, Listerine)
   - Non-steroidal anti-inflammatory drugs (flurbiprofen, naproxen)
   - Antibiotics (metronidazole, doxycycline, amoxicillin)
   - Irrigation
   - Localized antibiotic therapy (e.g., Periochip, Atridox, Arestin)
5. Scaling and root planing (ultrasonic instrumentation combined with hand instrumentation)
6. Re-evaluation of response to therapy
7. Supportive periodontal treatment
   - Fluoride therapy
   - Desensitization therapy
8. Periodontal surgery

MAJOR OUTCOMES CONSIDERED

- Effectiveness of treatment in reducing disease progression and preventing need for surgery
- Patient compliance

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Literature searches were conducted through the University of Minnesota Biomedical Library as well as computer searches using Medline and PubMed.

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Not stated

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Not applicable

METHODS USED TO ANALYZE THE EVIDENCE

Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

Not stated

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

Articles were reviewed and discussed by a committee of dentists, including a periodontist.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Not applicable

COST ANALYSIS

A formal cost analysis was not performed and published cost analyses were not reviewed.

METHOD OF GUIDELINE VALIDATION

External Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

A draft of the guideline document was sent to expert reviewers for comment.

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Gingivitis and Chronic Adult Periodontal Disease: Initial Therapy and Supportive Treatment

Diagnosis of Gingivitis

Plaque associated gingivitis is the most common of periodontal diseases. Diagnosis is based on the signs of inflammation. In clinical practice identification of the signs of inflammation; redness, gingival bleeding, and tissue edema establish the diagnosis of gingivitis or periodontitis.

It is important to distinguish gingivitis from chronic adult periodontal disease. Signs of inflammation without any tissue attachment loss are likely gingivitis without periodontitis. Diagnosis is more difficult when attachment loss has occurred. It must be established whether the attachment loss is due to an active disease process or developmental predisposition.

Numerous systemic factors including hormonal changes associated with adolescence and pregnancy, mouth breathing, medications, and immune status can precipitate or intensify gingivitis. In these cases removal of the local factors of plaque, calculus and iatrogenic dentistry can be expected to improve the clinical status of the patient.

Diagnosis of Chronic Adult Periodontal Disease

Diagnosis is generally based on two criteria: evidence of active disease process through the signs of inflammation, and documentation of attachment loss. This is simplistic, as the importance of specific bacteria and of the host response has been demonstrated in research. In clinical practice, at this time, the tools for diagnosis of periodontitis are simple. Maintenance of good record practices is essential, as they allow identification of long term treatment success, and permit efficient treatment of the patient.

Comprehensive Periodontal Assessment

A comprehensive periodontal assessment is performed by the dentist. Complete periodontal records and recent radiographs are required. Prior to active periodontal therapy there must be an exam to establish a diagnosis and treatment plan. At the reevaluation visit the comprehensive periodontal exam must be repeated by the dentist to ensure that therapy had the desired effects, and to recommend further active therapy, referral or maintenance interval. In maintenance, new full mouth radiographs are required every two to five years.

Periodontal Records

Periodontal records at the initial and re-evaluation examination and at each supportive periodontal therapy visit should contain:

- Current radiographs (within 6 months in active disease, two years in maintenance showing all crestal bone with proper angulation)
- Full mouth probing with attachment levels recorded
- Notation of the extent of furcal invasion
- Mobility recording
- Bleeding and suppuration points
- Plaque control evaluation with disclosing solution (may be omitted if patient consistently demonstrates excellent plaque control) with documentation; location and extent should be recorded with words such as heavy,

generalized, posterior, facial, marginal, etc. Patient should see disclosed plaque and work with provider to remove
- Notation to the oral hygiene difficulties noted, and the recommendations to allow for improved personal oral hygiene (p.o.h.)
- Problem areas
- Next visit purpose
- Recall interval

Classification of Periodontal Disease

The American Dental Association (ADA) classifications are used in the insurance industry for third party payment. They provide an indication of previous attachment loss, but not a useful index of current disease activity.

A more useful scheme for classification provides for the division of plaque related adult periodontal diseases by the degree that the attachment is compromised in the presence of the signs of inflammation that may indicate active attachment loss. When the modifiers of local versus generalized are applied to the descriptor for the level of attachment loss (gingivitis and mild, moderate, and severe periodontitis) the periodontal condition can be described. (Refer to the original guideline document for diagnostic codes for periodontal disease.)

The Progressive Periodontal Lesion

Periodontal disease does not progress linearly in time or location. Periodontitis is site specific. While inflammation is necessary for attachment loss, the presence of inflammation does not mean that attachment will be lost. Loss of attachment occurs in episodes. Discerning the active periodontal lesion from gingivitis requires keen observation, good record keeping, and clinical judgment. In active periodontitis the loss of attachment proceeds approximately from the crown to the apex, but there are strong components of lateral extensions of attachment loss. These factors, along with the resistance of the attachment to probe penetration allow for wide variation in probing depths over time. Regular probing of attachment and pocket depth is essential in monitoring during periodontal therapy and maintenance.

Microbiology of Periodontal Disease

While it is apparent from research studies that specific bacteria play distinct roles in periodontitis this knowledge has not changed the therapy for adult chronic periodontitis. The subgingival space is colonized by bacteria that occupy the depth of the pocket attaching to epithelial cells, bacteria in the pocket exudate, and in superficial layers of the root surface. There is a relationship between the supragingival plaque and the number and pathogenicity of bacteria in periodontal pockets.

Conventional non-surgical periodontal therapy strives to disrupt the pocket bacteria through:

- Scaling to remove calculus, allowing a reduced attachment area for plaque
- Root planing to remove the superficial infected and affected root surface

- Restorative treatment to eliminate areas of plaque retention and tissue damage
- Oral hygiene instruction and monitoring to control supragingival and marginal plaque

Nonsurgical therapy is the first line of treatment of periodontal disease in the general practice. As long as patient compliance is good and access is possible, nonsurgical therapy provides predictable results.

Ultra-sonics in Periodontal Disease

Used with hand instruments ultra-sonic scalers provide superior debridement over either instrument alone. This is especially true in furcal areas. Ultra-sonics disrupt calculus and bacterial colonies more effectively in areas that have limited space for instrumentation than do hand scalers. Ultra-sonics provide active lavage throughout therapy. This works to remove calculus fragments that could otherwise become incorporated in the damaged pocket epithelium.

In treatment of periodontitis ultrasonic scaling allows root debridement with ample lavage, with minimal soft tissue damage and detoxification of the cemental surface.

Ultrasonic scalers can be shown in electron micrographs to leave roughened root surfaces. If used properly the surface roughness is equivalent to that left by hand instruments. If excessive energy is used, or if the instrument is left in a single area and not kept in constant motion, the root surface can be damaged.

Sonic scalers are inferior to the modem ultrasonic scalers in the treatment of periodontitis. Sonic scalers are more likely to damage root surfaces, and have heavier tips that are not well suited for treatment of deep pockets or in certain areas of the mouth. The heavy tips and ease of use of the sonic scalers (such as the Titan) are advantages for the removal of supragingival deposits.

Treatment Goals in Periodontal Disease

The intent of active periodontal therapy is to interrupt the progressive destruction to the periodontium caused by inflammation. Not only does this mean stopping the immediate loss of attachment, but leaving pocket depths and tissue contours that are manageable for the patient with home care and regular supportive therapy. It is also important that the periodontium can be monitored, so that relapse can be identified and treated.

The ultimate treatment goal is to restore and maintain the health, comfort, function and appropriate esthetics of teeth for the lifetime of the individual.

Patient Compliance in Periodontal Disease

The chronic and pain free nature of the initial stages of periodontal disease make patient acceptance of the diagnosis and treatment difficult. Economic factors and priorities may also influence a patient's acceptance of care. When a patient refuses recommended periodontal therapy or referral, this must be documented.

Elements of this documentation:

- Description of the problem that requires care
- Specific treatment proposed or reason for referral
- Potential consequences of not following treatment recommendation or referral
- The fact that the patient refuses care or referral

Adjunctive Therapies in Gingivitis and Adult Periodontitis

Antibiotics

(See also Appendix F in the original guideline document for a more extensive discussion of antibiotics.)

Metronidazole has been shown to reduce the need for periodontal surgery when used in conjunction with scaling and root planing.

Metronidazole 250 mg three times per day (tid) for 7 days

Amoxicillin has shown little usefulness when used alone in chronic periodontal conditions because of the presence of bacterial resistance. In patients who cannot tolerate tetracycline, amoxicillin with metronidazole provides a similar spectrum of activity.

Amoxicillin 250 mg tid for 7 days with

Metronidazole 250 mg tid for 7 days

Doxycycline has been shown to reduce the activity of periodontitis for up to seven months when used in conjunction with scaling and root planing.

Doxycycline 200 mg first day 100 mg. Daily for 14-21 days

Anti-inflammatories

Flurbiprofen, naproxen and similar anti-inflammatories have been shown to reduce the rate of periodontal destruction in patients with rapidly progressing periodontitis, but are not in regular therapeutic use in typical adult periodontitis.

Anti-microbial Rinses

(See also Appendix D in the original guideline document for a more extensive discussion of chlorhexidine)

Chlorhexidine has been shown to be effective in reducing gingivitis. It is staining and may alter taste sensation.

Chlorhexidine 0.12% (Peridex®) 5 oz. rinse twice daily.

Listerine® has been shown to be effective in reducing gingivitis. It does not have the degree of effectiveness that is shown by chlorhexidine, but also does not stain or alter taste sensation.

Pocket Irrigation

Subgingival irrigation (or lavage) is recommended by some as a method of maintaining periodontal pockets. Studies do not present a clear conclusion of the efficacy of pocket irrigation. There are indications that irrigation after scaling and root planing further decreases the number of pocket pathogens, that there is equivalency between syringe type and the mechanical products, and that there may be some advantage in using a medicament such as chlorhexidine (immediately after scaling chlorhexidine may be inactivated by blood; povidone iodine has been recommended for use in post-treatment lavage).

Locally Administered Antibiotics

(See also Appendix E in the guideline document for a more extensive discussion of Periochip, Atridox and Arestin)

Significant pocket reduction has been demonstrated.

See the original guideline document for procedure codes for adjunctive interventions.

Supportive Periodontal Treatment

Goal of Supportive Periodontal Treatment

The phase of periodontal therapy after control of the disease is demonstrated is supportive periodontal treatment, (S.P.T.). It is the phase of care intended to sustain the level of periodontal health established after active therapy. As periodontal disease is chronic in nature, S.P.T. may be a life long process. The aim of S.P.T. is to limit the progression of attachment loss, and provide a level of monitoring that will recognize the progression of disease. S.P.T. works to ensure that active therapy is resumed when appropriate.

The Mechanics of Supportive Periodontal Treatment

The instrumentation required in an S.P.T. visit may be similar to that required in a routine prophylaxis visit, but the attention to record keeping and potential etiologic factors in disease is not. The S.P.T. patient has demonstrated risk for periodontitis and the potential for continued attachment loss. A full mouth probe and recording of pockets greater than 4 mm, attachment loss, bleeding and suppuration is an important part of each S.P.T. visit. The periodontal exam must establish whether there has been a progression of disease, and identify the signs of potential progression.

Provider of Supportive Periodontal Treatment

The appropriate provider of supportive treatment will vary with the:

- Aggressiveness of the initial periodontal condition
- Treatment provided for the initial periodontal condition
- Complexity of the periodontal instrumentation
- Patient compliance with home care instruction
- Presence of risk factors (heredity, smoking, diabetes, etc.)

General Dentist Recall

If the general dental office was solely involved in the initial therapy, they are responsible to set the recall interval and coordinate these visits with the need for operative recall. The expectation is that when a periodontal patient is treated in the general dental practice, the standard of care is at the same level as the periodontist. This includes record keeping and the recognition of the progression of disease.

Shared Recall

If the periodontist was involved in the initial therapy, he or she should be relied upon to recommend the initial interval and provider for recall. Appropriate operative recalls are required, and these must be coordinated with the general dentist. The caries risk protocol should be used as a guide in scheduling these visits. If operative needs do not take precedence it is appropriate that the radiographic interval is set by the periodontist. Recalls that alternate between the general dentist and the periodontist require communication for consistent care and understanding of the status of the case. Problems found at the visit, recommendations made, and plans for the next recall must be communicated not only to the patient, but to the provider for the next visit. Two years of stable periodontal condition may indicate that care can revert exclusively to the general practice, as long as the patient remains in control.

Periodontist Exclusive Recall

When supportive therapy in a general practice setting may compromise periodontal care periodontal recalls should occur only with the periodontist. This would be most likely in instances where active therapy was just completed, when there is a question about the stability of the case, or when specific unresolved local factors (such as furcation involvement), present specific challenges for recall. Operative recalls at an appropriate interval should be scheduled at general dental practice. Communication of the periodontal, operative, and recall status of the patient should occur between providers.

Adult Plaque Related Periodontal Disease: Algorithm Annotations

1. **Signs of Gingivitis or Adult Periodontitis**
    - Periodontal screening:
        - Clinical signs of active disease (erythema, edema, bleeding or suppuration on probing)
        - Clinical or radiographic indication of attachment loss in individuals less than age 35 is likely some other condition;

possibly rapidly progressing periodontal disease, or a primary systemic problem

2. **Initial Preparation to Allow for an Evaluation**
    - Heavy calculus:
        - When accretions prevent accurate probing initial preparation with an ultra-sonic scaler to remove ledges of supra and sub calculus is appropriate.
        - Should initial preparation be required access to pockets may be compromised by a tightened gingival cuff; the ultra-sonic scaler can be used to "open up" pockets for root planning.
    - Necrotizing gingivitis:
        - Indicated by acute sensitivity, ulcerated gingival tissue, and bleeding to very gentle probing
        - Topical and systemic medications with debridement may be required prior to complete periodontal assessment.
    - Dental condition:
        - Caries may require temporary restoration prior to periodontal assessment.
        - Hopeless teeth (bone loss to apex, cracked roots, unrestorable operatively) may interfere in a diagnosis, and may require removal prior to a complete assessment.
        - Restorations with large overhangs may need to be replaced to allow for a complete periodontal evaluation.

3. **Comprehensive Periodontal Examination**
    - Radiographs:
        - Bite wing radiographs showing crestal bone within six months are required for active periodontitis patients.
        - A full mouth series, less than two years old, is indicated; if periodontitis is limited, to specify teeth periapicals in that region, with current bite wings and a panographic radiograph are acceptable
    - Visual exam of tissues:
        - Tissue tone (edematous, hyperplastic)
        - Color (erythema)
    - Plaque and calculus assessment:
        - Plaque disclosed and described in the record
        - Calculus amount (light, heavy, moderate)
    - Periodontal charting:
        - Attachment loss
        - Pocketing
        - Furcation (score 1 = incipient, fluting; 2 = catch, probing has a horizontal component; 3 = through and through)
        - Bleeding and suppuration
        - Mobility (score 1 is mobility that is slightly greater than normal; 2 represents approximately 1 mm of mobility; 3 is greater than 1 mm of mobility or depressable apically)
        - Mucogingival relationships

4. **Plaque Related Gingivitis**
    - Characteristics of plaque related gingivitis:

- Indications of active disease (edema, erythema, bleeding on probing, or suppuration) without indications of attachment loss in probing or radiographs

5. **Adult Periodontitis with Slight to Moderate Loss of Periodontal Support**
    - Characteristics of adult periodontitis with slight loss of attachment in affected teeth:
        - Indications of active disease (edema, erythema, bleeding on probing, or suppuration)
        - Mobility may be present
        - If molar teeth are involved class I furcation involvement may be present.
        - Radiographic bone loss may be apparent.
        - Attachment loss of 2-3 mm
        - Pocket depth of 4-5 mm
        - Age 35 years of age or older (inflammation and attachment loss in younger individuals is likely some other condition; possibly rapidly progressing periodontal disease, or a primary systemic problem)
    - Characteristics of adult periodontitis with moderate loss of attachment in affected teeth:
        - Indications of active disease (edema, erythema, bleeding on probing, or suppuration)
        - Mobility may be present
        - Loss of up to one third of the attachment level
        - If molar teeth are involved furcation involvement should not exceed class one (incipient).
        - Radiographic bone loss will be apparent.
        - Attachment loss of more than 4-5 mm
        - Pocket depth of 5-6 mm
        - Age 35 years of age or older (inflammation and attachment loss in younger individuals is likely some other condition; possibly rapidly progressing periodontal disease, or a primary systemic problem)

6. **Adult Periodontitis with Advanced Loss of Periodontal Support**
    - Characteristics of adult periodontitis with advanced loss of attachment in affected teeth:
        - Indications of active disease (edema, erythema, bleeding on probing, or suppuration)
        - Mobility may be present
        - Loss of more than one third of the attachment level
        - If molar teeth are involved greater than class I furcation involvement can be expected.
        - Radiographic bone loss will be apparent.
        - Attachment loss of more than 5 mm
        - Pocket depth of greater than 6 mm
        - Age 35 years of age or older (inflammation and attachment loss in younger individuals is likely some other condition; possibly rapidly progressing periodontal disease, or a primary systemic problem)

Plaque Related Gingivitis: Algorithm Annotations

1. **Local factors**
    - Oral hygiene:
        - Good oral hygiene is an essential element in predictable treatment of gingivitis.
    - Calculus:
        - Provides both a physical irritant and a refuge for bacteria and bacterial toxins
        - Effective removal of calculus is important in altering the bacterial flora and treating gingivitis.
    - Contact relationships:
        - Open contacts can subject the periodontal tissues to the direct irritation of food impaction.
    - Defective restorations:
        - Marginal openings are a refuge for bacteria.
        - Overhanging margins alter tissue contours, retain bacteria, and frustrate hygiene efforts.
    - Tooth malposition:
        - Tipped teeth can produce pseudopocketing and complicate hygiene efforts.
        - Root approximation hinders hygiene efficacy and can result in accelerated bone loss in the presence of inflammation.
    - Orthodontic therapy:
        - Orthodontic appliances are found to often promote localized gingivitis by direct irritation and plaque retention.
        - If gingivitis cannot be controlled through oral hygiene the use of adjunctive agents such as chlorhexidine gluconate or a power toothbrush should be considered.
        - Removal of orthodontic appliances should be considered if gingivitis is severe.

2. **Systemic Factors (see also appendix B of the original guideline document)**
    - Systemic medical conditions:
        - Diabetes
        - Corticosteroid therapy
        - Chemotherapeutic agents
        - Hematological disorders
        - Tobacco habit
        - Drug abuse
        - Pregnancy and other endocrine factors
        - Medications that cause tissue hypertrophy
        - Mouth breathing

3. **Referrals for Systemic Issues (see also appendix B of the original guideline document)**
    - Smoking and oral tobacco use:
        - Clinic based smoking cessation
    - Medications:
        - Physician referral to explore alternative therapies with less periodontal impact

- Host response:
    - An apparent failure of host response in patients with a diagnosed or suspected metabolic disorder may suggest a referral for medical evaluation.
- Mouth breathing:
    - Surgical correction of the nasal airway may reduce mouth breathing.
    - Orthodontic therapy, alone or in combination with orthognathic treatment can sometimes reduce mouth breathing.
    - Use of a protectant, such as orobase at night on affected tissues at bed time may help reduce the affects of the drying affects of mouth breathing.

4. **Scaling**
    - Criteria:
        - Complete removal of plaque and calculus
    - Treatment:
        - Ultra-sonic instrumentation saves time with supragingival deposits and provides improved instrumentation where access is poor.
    - May require local anesthesia

5. **Is an Adequate Response to Therapy Likely?**
    - Factors that increase the likelihood of resolution:
        - Heavy, accessible calculus deposits
        - Edematous versus hyperplastic tissues
        - Good patient acceptance of oral hygiene instruction
        - Good tooth alignment
    - Factors that decrease the likelihood of resolution:
        - Mucogingival problems
        - Hyperplastic tissues
        - Minimal calculus at initial instrumentation
        - Excellent oral hygiene at initial exam
        - Low patient acceptance of problem

6. **Re-evaluation for Response to Therapy**
    - Generally a re-evaluation should be scheduled, especially in cases of moderate to severe gingivitis, and when an adjunctive mouth rinse is prescribed.
    - When a reevaluation is prescribed:
        - It should be scheduled at 4-6 weeks after last treatment appointment.
        - Oral hygiene should be reviewed.
        - Periodontal exam is repeated.
        - Remove residual calculus.
        - Expect resolution of signs of active disease.
        - Clinical judgment is critical in determining whether treatment was successful.

7. **Non-plaque Related Gingivitis**
    - A number of forms of gingivitis are found in association with other diseases or conditions. Desquamative gingivitis is characterized by

sloughing of the gingival epithelium, leaving a red gingival surface. Estimates are that more than 90% of these cases are a manifestation of cicatrical pemphigoid and erosive lichen planus. Allergies and other dermatological disorders have been associated with this form of gingivitis.

- Idiopathic gingivitis or gingivofibromatosis is of unknown etiology. Clinical presentation includes enlargement of gingival tissues that begins with the eruption of the primary and secondary teeth. This enlargement may regress after the extraction of teeth.
- Herpetic gingivostomatitis can present as painful ulcerations of the gingival tissues and is the result of infection with the herpes simplex I virus. The infection may present as vesicles that form and then rupture, leaving painful ulcerations with red, halo-like margins. Fever, malaise, and lymphadonopathy may be present. Treatment is primarily palliative. It is important that adequate nutrition is maintained.
- Necrotizing ulcerative periodontitis (NUP) is a severe and rapidly progressive disease that demonstrates a distinctive erythema of the gingiva, soft tissue necrosis, and severe loss of periodontal attachment. Necrotizing ulcerative gingivitis (NUG) (previously known as atypical necrotizing ulcerative gingivitis [ANUG]) can be localized or generalized. The interproximal papillae may have a punched out look, and be covered by a grayish-white membrane. Pain and halitosis are common features. Other symptoms include rapid onset, malaise, lymphadenopathy, loss of appetite, and occasional fever. Commonly sited etiologies for NUG include lack of oral hygiene, stress, anxiety, fatigue, lowered immune resistance, nutritional impairment, smoking, and calculus. Increased numbers of oral bacteria, such as spirochetes and fusiform bacteria are seen.
- During the acute phase of NUG the most effective treatment is the use of the ultrasonic scaler. This not only allows for the removal of gross debris such as calculus but also provides a gingival lavage that helps flush the bacteria from gingival pockets. This treatment generally reduces the acute symptoms sufficiently to allow for effective subgingival scaling and root planing as necessary. Oral rinses such as Peridex® can be beneficial. Antibiotics are generally not indicated unless the patient has systemic involvement such as elevated temperature, spread of the infection into the pharynx, or lymphadenopathy. Surgery to repair gingival defects may be indicated after the infection has been resolved.

Adult Periodontitis with Slight/Moderate Loss of Periodontal Support: Algorithm Annotations

1. **Local factors**
    - Oral hygiene:
        - Good oral hygiene producing a low plaque level is an essential element in predictable periodontal therapy.
    - Calculus:
        - Provides both a physical irritant and a refuge for bacteria and bacterial toxins.
        - Effective removal of calculus is important in altering the bacterial flora of the periodontal pocket.

- Contact relationships:
    - Open contacts can subject the periodontal tissues to the direct irritation of food impaction.
- Defective restorations:
    - Marginal openings are a refuge for bacteria.
    - Overhanging margins alter tissue contours, retain bacteria, and frustrate hygiene efforts.
- Tooth malposition:
    - Tipped teeth can produce pseudopocketing and interbony defects.
    - Root approximation hinders hygiene efficacy and can result in accelerated bone loss in the presence of inflammation.
- Perio-endo relationships:
    - Localized deep defects should be evaluated for possible perio-endo relationship.
    - Long standing endo defects become periodontal pockets, and require periodontal maintenance.
- Occlusion:
    - Should be evaluated when mobility is identified
- Tooth morphology:
    - Invaginations can result in severe localized periodontal defects.
    - Multirooted variants of non-molars introduce possible furcal invasion and reduce prognosis.

2. **Systemic factors**
    - Systemic medical conditions:
        - Diabetes
        - Corticosteroid therapy
        - Chemotherapeutic agents
        - Hematological disorders
        - Tobacco habit
        - Drug abuse
        - Pregnancy and other endocrine factors
        - Medications that cause tissue hypertrophy

3. **Referrals for Systemic Issues**
    - Smoking or oral tobacco use:
        - Clinic based smoking cessation
    - Medications:
        - Physician referral to explore alternative therapies with less periodontal impact
    - Host response:
        - An apparent failure of host response in patients with a diagnosed or suspected metabolic disorder may suggest a referral for medical evaluation.

4. **Is an Adequate Response to Therapy Likely?**
    - Factors that increase the likelihood of resolution:
        - Edematous tissues at initial examination
        - Horizontal versus vertical pattern of bone loss
        - Absence of furcal invasions and concave root surfaces

        - Indication of patient interest in treatment and improvement of oral health
    - Factors that decrease the likelihood of resolution:
        - Mucogingival problems
        - Interbony defects
        - Furcation involvement
        - Heavy occlusal or restorative loading (bridge and partial abutments)
        - Hyperplastic tissues
        - Minimal calculus at initial instrumentation
        - Excellent oral hygiene at initial exam

5. **Scale and Root Plane**
    - Criteria:
        - End point is to affect a change in the microbacterial distribution within the pocket and surrounding tissue; not strictly calculus removal.
    - Treatment:
        - Ultra-sonic instrumentation, when combined with hand instrumentation, provides improved instrumentation where access is poor (i.e., furcations, deep pockets, posterior teeth).
        - Generally requires local anesthesia.

6. **Re-evaluation for Response to Therapy**
    - Performed at 4-6 weeks after last quadrant treated
    - Review oral hygiene.
    - Repeat periodontal probing for furcal invasions, attachment and pocket depths.
    - Review mobility, bleeding, and suppuration.
    - Examine root surfaces for smoothness.
    - Remove residual calculus.
    - Expect resolution of 1-2 mm pocket depth.
    - Expect resolution of signs of active disease.
    - Clinical judgment is critical in determining whether treatment was successful.

7. **Compromise Therapy**
    - Less than complete periodontal control may be unavoidable in some instances:
    - Advanced age
    - Chronic illness
        - May contraindicate therapy
    - Extremely poor prognosis
        - For the dentition for periodontal or other reasons
    - Economic considerations may dictate compromise therapy
        - Patients may not be able afford or chose not to pursue periodontal therapy because of the expense of treatment.
    - Patient refuses specialist care:
        - Patient must be informed of potential consequences including tooth loss.

        - Documentation must include treatment options presented to the patient, and that the patient made an informed decision to not comply with a recommended referral.
    - Adjunctive therapy:
        - Use of systemic or topical medications in a general dental practice, without exhausting conventional therapy and referral is a compromise therapy.
        - There is evidence that use of nonsteroidal anti-inflammatories can slow bone loss in adult periodontitis.
        - Antibiotics, especially metronidazole and doxycycline have been shown to change bacterial flora and slow the progression of attachment loss.
        - Irrigation may serve as an adjunctive therapy in pockets that are not accessible to conventional oral hygiene devices.
        - Localized antibiotic therapy (currently Atridox, Periochip, or Arestin) has been shown to temporarily reduce pocketing and increase attachment levels.

Adult Periodontitis with Advanced Loss of Periodontal Support: Algorithm Annotations

1. **Local factors**
    - Calculus:
        - Provides both a physical irritant and a refuge for bacteria and bacterial toxins
        - Effective removal of calculus is important in altering the bacterial flora of the periodontal pocket.
    - Contact relationships:
        - Open contacts can subject the periodontal tissues to the direct irritation of food impaction.
    - Defective restorations:
        - Marginal openings are a refuge for bacteria.
        - Overhanging margins alter tissue contours, retain bacteria, and frustrate hygiene efforts.
    - Tooth malposition:
        - Tipped teeth can produce pseudopocketing and interbony defects.
        - Root approximation hinders hygiene efficacy and can result in accelerated bone loss in the presence of inflammation.
    - Perio-endo relationships:
        - Localized deep defects should be evaluated for possible perio-endo relationship.
        - Long standing endo defects become periodontal pockets and require periodontal maintenance.
    - Occlusion:
        - Should be evaluated when mobility is identified
        - Temporary or long term fixed splinting may be indicated when attachment loss leaves teeth uncomfortable or unstable.
    - Tooth morphology:
        - Invaginations can result in severe localized periodontal defects.
        - Multirooted variants of non-molars introduce possible furcal invasion and reduce prognosis.

2. **Systemic Factors**
    - Systemic medical conditions:
        - Diabetes
        - Corticosteroid therapy
        - Chemotherapeutic agents
        - Hematological disorders
        - Tobacco habit
        - Drug abuse
        - Pregnancy and other endocrine factors
        - Medications that cause tissue hypertrophy

3. **Compromise therapy**
    - Treatment to provide less than complete periodontal control may be unavoidable in some instances:
    - Advanced age
    - Chronic illness
        - May contraindicate therapy
    - Extremely poor prognosis
        - For the dentition for periodontal or other reasons
    - Economic considerations may dictate compromise therapy
        - Patients may not be able afford or choose not to pursue periodontal therapy because of the expense of treatment.
    - Patient refuses specialist care:
        - Patient must be informed of potential consequences of tooth loss.
        - Documentation must include treatment options presented to the patient, and that the patient made an informed decision to not comply with a recommended referral.
    - Adjunctive therapy:
        - Use of systemic or topical medications in a general dental practice, without exhausting conventional therapy and referral is a compromise therapy.
        - Antibiotics, especially metronidazole and doxycycline have been shown to change bacterial flora and slow the progression of attachment loss.
        - Irrigation may serve as adjunctive therapy in pockets that are not accessible to conventional oral hygiene devices.
        - Localized antibiotic therapy, (currently Atridox, Periochip and Arestin), has been shown to temporarily reduce pocketing and increase attachment levels.

4. **Scale and Root Plane**
    - Criteria:
        - End point is to affect a change in the microbacterial distribution within the pocket and surrounding tissue; not calculus removal alone.
    - Treatment:
        - Ultra-sonic instrumentation, when combined with hand instrumentation, provides improved debridement where access is poor (i.e., furcations, deep pockets, posterior teeth).
        - Generally requires local anesthesia

5. **Re-evaluation for Response to Therapy**
    - Performed at 4-6 weeks after last quadrant treated
    - Review oral hygiene.
    - Repeat periodontal probing for furcal invasions, attachment and pocket depths.
    - Review mobility, bleeding, and suppuration.
    - Examine root surfaces for smoothness.
    - Remove residual calculus.
    - Expect resolution of 1-2 mm pocket depth.
    - Expect resolution of signs of active disease.
    - Clinical judgment is critical in determining whether treatment was successful.

Supportive Periodontal Treatment: Algorithm Annotations

1. **Successfully Treated Gingivitis and Early and Moderate Periodontitis**
    - Considerations for maintenance therapy exclusively in the general dental office
        - Good response to initial therapy (minimal residual pocket depth)
        - Good compliance with oral hygiene and treatment recommendations
    - Considerations for maintenance therapy shared between the general dental office and the periodontist
        - Mixed response to initial therapy (pockets remain)
        - Inadequate oral hygiene
        - Evidence of compromised host response

2. **Successfully Treated Advanced Periodontitis**
    - Considerations for maintenance therapy exclusively in the general dental office
        - History of stable attachment for several years
        - Periodontal therapy has left minimal pockets and boney defects.
        - Good compliance with oral hygiene recommendations
    - Considerations for maintenance therapy shared between the general dental office and the periodontist
        - Questionable response to initial therapy or compromised areas (residual pocketing, Furcal involvement)
        - Poor compliance with oral hygiene recommendations
        - Extensive restorative treatment required
    - Considerations for maintenance therapy exclusively in the periodontist's office
        - Possible or previous rapidly progressing periodontal patient compromise initial therapy (trial maintenance)
        - Extensive remaining defects
        - Further active therapy is likely

3. **Refractory**
    - Considerations for maintenance therapy exclusively in the periodontist's office

        - Generally allows for earliest detection and intervention should there be recurrence
    - Considerations for maintenance therapy shared between the general dental office and the periodontist
        - Loss of dentition is deemed inevitable.
        - High restorative need

4. **Radiographic Interval**
    - The periodontal recall interval for radiographs for a patient in supportive periodontal therapy should not exceed two years for bite-wing radiographs that show the boney crest and are of acceptable horizontal angulation. More frequent radiographs are appropriate when there are questions of the adequacy of control, when there are intraboney defects, and when bone grafting or guided tissue regeneration were elements of recent active therapy. For patients with episodes of active disease, or where control is questionable a five year interval for a full mouth series is indicated.

5. **Comprehensive Periodontal Recording**
    - Periodontal records at each supportive periodontal therapy visit should include:
        - Current radiographs
        - Full mouth probing and attachment loss records (record pockets of >3 mm depth, bleeding, suppuration, and any attachment loss)
        - Notation of furcal invasion
        - Mobility recording
        - Bleeding and suppuration points
        - Plaque control disclosing and evaluation (may be omitted if patient consistently demonstrates excellent plaque control, and a note to that effect is in made)
        - Notation of oral hygiene difficulties, and the recommendations to allow improved oral hygiene
        - Problem areas
        - Next visit purpose
        - Recall interval (if the patient is to remain on S.P.T.)

6. **Is Periodontal Disease Controlled?**
    - For a patient to be considered for continued supportive periodontal therapy both the periodontal record and clinical signs must be used to establish a clinical judgment that the disease is not progressing. Recordings of attachment level show variability of 2-3 mm without a true change in attachment level. Radiographs show level of boney support, not attachment level, and 2-3 mm of change are required to demonstrate change with standard radiographic techniques. While the truest measure of active periodontal disease, significant damage can occur without documentation by these modalities. The clinical signs of active disease (erythema, edema, bleeding or suppuration on probing) are less specific for active periodontal disease, but are timelier.

7. **Supportive Periodontal Treatment**
    - Fluoride therapy in furcal areas

        - Furcal caries are often unrestorable.
        - Open furcations are at risk for furcal caries.
        - The maintenance visit presents an opportunity to place topical fluoride agents in this high risk area.
    - Desensitization therapy
        - Root sensitivity is common in periodontal maintenance patients.
        - Sensitivity can interfere with home care efforts.
        - Topical agents are available that can provide limited desensitization.
        - The maintenance visit provides an opportunity to place these medications when indicated (history of post therapy sensitivity).

8. **Retreat or Referral**
    - Performed at 4-6 weeks after last quadrant treated
    - Review oral hygiene.
    - Signs of active disease indicate need for active therapy.
    - If etiology is unclear or requires surgery to remedy, refer.
    - Repeated scaling and root planing (two year intervals) are required to maintain some patients.

9. **Recall Interval**
    - Generally 3 months initially
    - Adjust according clinical judgment of patient's response

Periodontal Therapy Appointment Management: Algorithm Annotations

1. **Radiographs**
    - A periodontal assessment should be performed to determine radiographs necessary beyond bite wings
    - Full mouth series:
        - Necessary for diagnosis and treatment planning in generalized periodontal disease
    - Bite wings:
        - Must show crestal bone to be diagnostic
    - Panographic radiograph:
        - May serve as an screening film in addition to selected periapicals and bite wings in localized periodontitis
        - Generally not indicated if full mouth periapicals are made

2. **Initial Debridement**
    - May be completed at the time of the screening exam if localized
    - May be combined with oral hygiene instructions if tenderness and bleeding are not pronounced

3. **Comprehensive Periodontal Exam**
    - Plaque disclosing
    - Complete charting
    - Radiographs available to correlate with charting

4. **Compromise Therapy**

- For economic or other reasons a patient may refuse the recommended therapy, but agree to a routine prophylaxis appointment; document:
    - Patient's understanding of periodontal condition, treatment recommendation, and
    - Likely outcome of noncompliance
    - Problem areas that were addressed and to what extent
    - Those areas that were not addressed
    - Plan for next visit
- Treatment plan:
    - Emphasis should be place on those teeth that treatment will likely make a difference.
    - Teeth without evidence of periodontitis are of low priority.
    - Visits may emphasize sides, quadrants or individual teeth.

5. **Scale and Root Plane, Initial Visit**
    - Generally performed within one week
    - Evaluate plaque control.
    - Review oral hygiene.
    - Evaluate response in previously treated quadrants.
    - Scale and root plane target quadrant, usually with anesthetic.
    - Consider adjunctive antibiotics.
    - Discuss rational and agenda for next periodontal visit.

6. **Additional Scaling and Root Planing Visits**
    - Performed urgent operative care and after periodontal diagnosis
    - Evaluate plaque control.
    - Review oral hygiene.
    - Reinforce treatment reasoning and plan.
    - Scale and root plane target quadrant, usually with anesthetic.
    - Discuss and agenda for next periodontal visit.

7. **Revaluation for Response to Therapy**
    - Generally performed at 4-6 weeks after last quadrant treated
    - Evaluate oral hygiene.
    - Review oral hygiene.
    - Comprehensive periodontal exam, including periodontal probing for furcal invasions, attachment and pocket depths; recording of mobility, bleeding, and suppuration
    - Examine root surfaces for smoothness and remove residual calculus.
    - Polish if necessary.
    - Discuss future periodontal therapy required.

Refractory Periodontitis

The term refractory periodontitis refers to that small percentage of treated patients with whom mechanical therapy including surgery fails to stop the loss of periodontal attachment. The pathogenesis of refractory periodontitis is poorly understood and these patients demonstrate a continued lack of response to conventional periodontal therapy. A clinical diagnosis of Refractory Periodontitis is generally made on this distinction.

Definitions and Descriptions

Refractory periodontitis has been associated with abnormal polymorphonuclear leukocyte (PMN) phagocytosis, an abnormal response by inflammatory mediators, chemotactic defects in PMNs, and cigarette smoking. Chemotactic defects in PMN may be an intrinsic chemotactic response (cellular or serum related) or may be the result of substances elaborated by bacteriological pathogens in the periodontal pocket. Data suggests refractory patients may have the potential for a more vigorous response by inflammatory mediators (cytokines) and that they appear to have a decreased CD4/CD8 ratio. Research reveals smoking causes defects in neutrophil function, impaired serum antibody responses to periodontal pathogens, and potentially diminished gingival fibroblast function. One study showed that subjects with refractory disease have higher levels of certain groups of pathogens and they differ in combinations of predominant species. Three major microbial complexes were observed:

1. *Tannerella forsythensis, Treponema denticola, Actinobacillus actinomycetemcomitans*
2. *Staphylococcus intermedius, Porphyromonus gingivalis, P micros*
3. *S intermedius, Fusobacterium nucleatum* with or without *Porphyromonus gingivalis*

Other data show no difference in the amount of plaque present in stable sites or sites losing attachment. Frequently few, if any, of the classical pathogens are detected in the plaque samples taken at the time progressive disease is diagnosed. This may indicate no clear or well defined microbial profile exists in refractory patients. Also, refractory periodontitis in some instances may represent re-infection from untreated significant others.

Treatment/Therapy

Preliminary analysis has indicated that at least two patterns or rates of attachment loss may be associated with refractory periodontitis and that each pattern may be indicative of a different micro flora. The pattern associated with a relatively rapid loss of attachment was characterized by a gram-negative flora which contained spirochetes*, P. intermedia*, and fusobacterium species. A slow, continuous rate was associated with a predominantly gram-positive flora containing a high proportion of *S. intermedius* and/or a *S. intermedius*-like organism.

Refractory periodontitis in systemically healthy adults can show a great variety or oral and non-oral organisms. The frequent occurrence of unusual periodontal organisms in certain patients may be due to a weakened host response and/or usage of various chemotherapeutic regimens.

A clinical case report in the literature demonstrates patients termed refractory to treatment (including surgeries) showed remission to the disease progress for a minimum of 2 1/2 years. This was accomplished after extensive micro-biological analysis and sensitivity testing was performed to determine appropriate antibiotic therapy, along with conservative therapy of several sessions of root planing and scaling.

Results indicate that a substantial number of microorganisms associated with refractory periodontitis are variably resistant to commonly-used antibiotics.

Diagnostic microbiology must be considered an essential adjunct to the therapist faced with periodontal lesions refractory to conventional treatment.

In patients who have not responded well to conventional treatment, cultural analysis is strongly recommended in order to select the appropriate antibiotic. The tetracyclines, metronidazole, augmentin, a combination of metronidazole and amoxicillin, and clindamycin have all been shown to be of benefit in treating some of these patients. However, the appropriate antibiotic can only be determined by the identification and susceptibility-testing of the individual patient's flora. No one antibiotic will successfully treat all cases of recurrent or refractory disease since the patients have different clinical and microbiological profiles. Treating these patients without microbial testing increases the risk of treatment failure and the potential for causing an overgrowth of resistant pathogens and an exacerbation of the disease.

While the patient is under control or in the maintenance phase of the disease process, a three month periodontal recall with a periodontist is recommended.

Every attempt should be made to maximize continuity or care. As a result, patients should be seen by the same providers and periodontist (doctor of dental surgery [DDS] and registered dental hygienist [RDH]). The general dentist is responsible for determining the caries exam recall.

Early Onset Periodontal Disease

The term Early Onset Periodontitis (EOP) refers to a number of overlapping diseases of the periodontium characterized by early age of onset and aggressive nature. Included in this constellation of diseases are prepubertal periodontitis, juvenile periodontitis (localized and generalized), and rapidly progressive periodontitis (Type A and Type B). These diseases result in rapid destruction of the periodontal tissues in otherwise generally healthy individuals. The age of onset varies from very early childhood (Generalized Prepubertal Periodontitis) to around age 35 (Type B form of Rapidly Progressive Periodontitis). As there tends to be familial patterns with EOP, a review of the family history of periodontal disease is key in reaching a diagnosis. A review of radiographs for abnormal patterns of bone loss is also critical in establishing a diagnosis. A clinical diagnosis of EOP is generally made on the basis of distribution of bone loss and age of onset.

Definitions and Descriptions

Prepubertal Periodontitis

Prepubertal periodontitis has been defined as either localized or generalized and affects the primary dentition. Both forms of the disease are characterized by defects in the polymorphonuclear leukocytes and/or monocytes. Prepubertal periodontitis is quite rare (the exact incidence of the disease was not stated in the literature reviewed). This form of periodontitis appears to affect males and females equally. One author has suggested that division of periodontal disease during childhood and adolescence into prepubertal and juvenile periodontitis may sometimes be a matter of when the diagnosis made rather distinct disease entities.

The localized form occurs in otherwise healthy children and has an age of onset around 4 years of age. The localized form may affect only a few teeth showing no particular pattern. It features little or no gingival inflammation and the tissue destruction is not as severe as seen in the generalized form. The localized form is usually responsive to good plaque control, curettage, and antibiotic therapy. Due to age of onset, tetracycline should not be used.

The generalized form occurs in children that generally are afflicted with systemic diseases (e.g., frequent bouts of otitis media and frequent upper respiratory infections). The age of onset with the generalized form coincides with the eruption of the primary teeth. Tissue inflammation is pronounced and destruction severe in this form and it may lead to advanced bone loss in the permanent dentition. These cases are difficult to treat successfully. Early diagnosis and referral to a periodontist for both localized and generalized prepubertal periodontitis is very important. Frequent recall intervals are indicated (every 2-3 months).

Aggressive Periodontitis

Juvenile periodontitis appears in two forms: localized and generalized. The age of onset of both forms is the circumpubertal period (11 to 14 years of age). There appears to be a familial tendency for this disease and there may be functional defects associated with the PMNs and/or monocytes. Localized juvenile periodontitis (LJP) is relatively rare with a reported incidence ranging from .1% to 3.4% of patients in a 10 to 19 age range. There is a reported female to male ratio of 3: 1 for this form of juvenile periodontitis. It has been suggested that this could be due to females having an earlier onset and diagnosis of the disease. The bone loss pattern is classically described as vertical around the first molars. Frequently there is also bone loss seen around the incisors. The bone loss pattern is most often symmetrical. It has been suggested that the first molars and incisors are affected because they are the first permanent teeth to erupt. (*Actinobacillus actinomycetemcomitans* [Aa] is able to colonize the teeth before other bacteria that inhibit Aa are able to establish a niche.) The current thinking is that Aa is spread among family members. There may also be inherited defects with the PMNs and/or monocytes that contribute to the individual's susceptibility. With proper treatment, this disease is stable in most individuals and has even been shown to "burn" itself out. This is the only form of Early Onset Periodontitis that has a specific bacterium associated with its etiology. Aa is found in over 95% of patients diagnosed with LJP as opposed to 17% of healthy subjects. Patients afflicted with LJP are otherwise healthy and there is generally very little plaque or gingival inflammation seen around the affected teeth. This further supports the notion of the importance of family history for this disease and a review of the radiographs for abnormal bone loss patterns.

Treatment for LJP involves meticulous plaque control, localized scaling and root planing, periodontal surgery, and antibiotic therapy. The primary treatment goal for root planing is the elimination of Aa from the affected site. Bacterial DNA testing for Aa is useful in confirming the diagnosis and in testing for a successful end point of treatment. This bacterium has demonstrated the ability to invade the connective tissue of the gingival pocket. As a result, conventional scaling and root planing are insufficient in eliminating the infection. Periodontal surgery to remove tissue from the periodontal pocket as well as treatment with tetracycline is very

important in arresting this disease. Tetracyclines possess a collagenase-inhibiting activity which may help reduce tissue breakdown and promote repair.

Aa has been shown to produce a number of potent virulence factors. Among these are a leukotoxin, a chemotaxis-inhibiting factor, a collagenase and an epithelio-toxin to assist it in penetrating the gingival epithelium. It has also been shown to produce a fibroblast toxin to prevent repair of damage it has caused. It is unknown which of these factors actually plays a role in tissue destruction in LJP. Several studies have shown that neutrophils from gingival lesions of LJP patients have reduced phagocytic capacity compared to neutrophils cultured from, similar lesions in patients with gingivitis or adult periodontitis. Early recognition and referral to a periodontist are very important in minimizing the effects of LJP.

The generalized form of juvenile periodontitis (GJP) occurs less commonly than the localized form (about half as frequently). GJP is characterized by rapid, severe bone loss around many or all of the permanent teeth with more pronounced gingival inflammation than is seen in the localized form. Plaque samples have been shown to have a high percentage of Gram negative rods including *Porphyromonas gingivalis*. The localized and generalized forms of juvenile periodontitis may have common underlying etiologies, however, differences in bacterial flora and immune responses have been shown. Several studies have demonstrated increased serum IgG antibody activity against Aa in patients with LJP but low titers against *P. gingivalis*. Patients diagnosed with GJP and adult onset periodontitis have demonstrated high titers against *P. gingivalis* and low titers against Aa. This further supports the notion that LJP and GJP are distinct diseases from a microbiological view. The rarity of this form of juvenile periodontitis makes it difficult to study.

As with the localized form, early detection and referral to a periodontist is very important. Treatments include scaling and root planing, antibiotic therapy and frequent recall (every 2-3 months). The prognosis for this disease is poor.

Rapidly Progressive Periodontitis (RPR)

These forms of periodontitis occur later in life than the disease described above. The Type A form generally occurs during the late teen to early 20's while the Type B form has an age of onset of the late 20's to mid-30's. Estimates of the prevalence of RRP vary greatly, possibly because of differences in examination procedures and criteria, and the use of clinical studies of select population groups rather than random sampling in epidemiologic studies. In general, RRP is relatively rare. Studies based on radiographic evidence and probing assessments report prevalence values of 0.2% for Norway, 0.1% for Finland and 0.5% for Brazil. Several studies point to 1:2 male to female ratio with some variability associate with age.

In most patients with rapidly progressive periodontitis, the PMNs do not function properly. Microbes are the primary pathogenic causative agents with a general distribution reported as 75% gram negative anaerobes and 25% gram positive microbes. RPP may be found in patients with systemic diseases (e.g., diabetes mellitus, Down's syndrome, or other diseases) or in otherwise healthy individuals.

Type A, or "classic" RPP exhibits rapid, generalized bone loss. Commonly, there is very little plaque or calculus. Depressed neutrophil function is found in about 2/3 of patients. The disease process is cyclic showing periods of acute inflammation followed by periods of dormancy. It is not uncommon to see a patient is his or her early 20s with 50% or greater of bone loss. Females are affected at a ratio of 3:1 over males.

RPP Type B is found in an older age group than Type A. Bone loss is generalized and significant. Bone loss is rapid relative to adult periodontitis but not as rapid as seen in Type A. It is common to find significant amounts of plaque and calculus with these patients. No sex predilection has been established and neutrophil chemotaxis is normal or depressed.

As with other EOP disease entities, early detection and referral to a periodontist is very important. Treatments generally consist of scaling and root planing, antibiotics, and surgery to correct anatomical defects. Usually tetracycline is used; however, metronidazole has been shown to be very effective. Removal of defective restorations and caries control is very important. The prognosis is guarded.

Inadequate Attached Gingiva

When a tooth has a minimal zone of attached gingiva on either its facial or lingual aspect, a potential mucogingival problem exists. Frenum and/or muscle attachments in the presence of inadequate attached gingiva should be viewed as a potential cause of future recession. Rather than being a fixed number of millimeters of attached gingiva, it is a clinical judgment of the adequacy of the attached gingiva on a tooth or teeth to remain stable and healthy under conditions imposed by any planned dental treatment or in the absence of dental care.

A. A simple guideline for deter-mining whether a pure mucogingival problem exists is to record all areas with less than 2 mm of total gingiva (free gingival margin to mucogingival junction) as being potential problems because they will have 1 mm or less attached gingiva when crevice depth is subtracted from the total gingiva.
B. For teeth with less that 1 mm of attached gingiva, the patients age should be considered. A younger person will be expected to retain their teeth for a longer period. The fact that a potential mucogingival exists early, represents a site-specific susceptibility. Generally speaking, the younger the patient, the greater the reason to consider grafting.

The permanent mandibular incisors and first molars are the first teeth to erupt and about 12% of incisor teeth have less than 1 mm of attached gingiva; half of these teeth may have recession within 6 months of eruption.

If the patient is a child or young adult with no root exposure, prophylactic grafting may be considered to prevent recession. If root exposure already exists but appears stable, grafting still should be considered because a graft placed on a periosteal bed has a better predictability of success than does grafting to cover an exposed root.

If a maxillary canine or premolar has an inadequate zone of attached gingiva, the potential exists for an esthetic problem. Mandibular canines or premolars do not usually present a cosmetic concern.

When a tooth is predisposed to recession due to a lack of attached gingiva, the situation can be stable. But if restorative or orthodontic treatment could create recession, prophylactic gingival grafting should be considered. If no such treatment is planned, the patient should be informed of the potential for recession and the need for regular evaluation of the situation.

Decisions regarding treatment will be a clinical judgment. If indecision exists, referral to a periodontist should be considered.

Root Exposure

Root exposure is a frequent finding and considerable difference of opinion exists regarding the need for reparative or preventive surgical treatment within dentistry. If recession has occurred, the number of millimeters of exposure should be recorded for future reference in determining if the recession is active or stable. Where 2 mm or less of total gingiva (free margin to mucogingival junction) is present, a pure mucogingival problem exists and surgical treatment should be considered.

The skill of the dentist in determining the sequence of events in a patient's dental history will usually determine the etiology. If root exposure is present, earlier records including casts and/or orthodontic models are helpful to determine if the situation is active or stable. Usually no records exist and in that case a patient's opinion can be helpful and should be considered when making a treatment decision. If the patient believes the root exposure occurred in the past and is stable, document the findings and continue to observe for change at recall, keeping in mind that future dental treatment can alter the situation. If indecision exists, but it is apparent that further recession would result in a less than satisfactory situation, grafting should be suggested. An example would be a shallow vestibule where further exposure would result in insufficient room to place a graft.

Factors that should be considered in a patient's dental history are the following:

1. Injuries may occur in sites predisposed to recession by the presence of inadequate attached gingiva. Such injuries may result from mastication, i.e., crusty bread and apples. Vigorous use of a toothbrush may result in generalized recession, but be more extensive on teeth with little attached gingiva or teeth in a prominent position with little labial buccal bone (especially canines, first premolars and mandibular central incisors).
2. Restorative procedures such as subgingival use of rotary instruments, taking an impression subgingivally and the cementation or polishing of a restoration in the presence of inadequate attached gingiva may cause recession.
3. Periodontal surgical and non-surgical procedures may cause generalized and/or localized recession. Evaluation of past periodontal therapy should always be considered.
4. The extraction of a tooth, especially in the presence of attachment loss may be followed by localized recession on adjacent teeth.

5. Abnormally positioned frenum and/or muscle attachments especially in the presence of a narrow zone of attached gingiva may contribute to recession. Frenum and/or muscle attachments may have increased effect in the presence of a shallow vestibule.

The criteria for deciding whether to treat or refer a patient to the periodontist should be based upon the severity of the diagnosed periodontal problem. The assessment of whether the problem is beyond the skill or management level of the individual dentist or dental hygienist and the extent to which treating the patient's problems will require a multi-disciplinary approach.

Maintenance of the Ailing Implant

Peri-Implant Disease

As implants have swept their way into dentistry's standard of care, so has the need for their maintenance, and the ability to diagnose and treat the peri-implant diseases that develop around them. The vast majority of implants that dentists will encounter will be of the endosseous type and to better understand peri-implant disease dentists must know how they differ from natural teeth.

Natural Teeth

A periodontal ligament (PDL) is present where the gingival fibers (Sharpeys fibers) are arranged perpendicular to the root surface and attached to the cementum, forming a crestal barrier between the oral environment and the supporting bone tissues.

Implant

Here, no periodontal ligament is present, but rather its collagen fibers are arranged parallel to the implant collar with little to no attachment to the implant. Only a weak hemidesmosornal epithelial attachment may be present which is probably of no clinical significance. An implant is functionally ankylosed. This lack of an attachment barrier along with a minimal vascular network within the collagen fiber collar suggests that the implant may be at increased risk to trauma and infection as compared to the natural tooth. Studies comparing plaque associated lesions around teeth and implants have shown that lesions around the implants become more pronounced and occupied a larger volume of connective tissue, suggesting that soft tissue inflammation around implants may have more serious implication than the marginal inflammation around teeth. To successfully treat the peri-implant lesion, the diagnosis must be based on the etiologic cause of the disease.

Diagnosis/Etiology

There are few qualitative differences in the bacterial flora surrounding implants and teeth, and as in periodontitis around natural teeth, the clinical findings of the ailing implant are quite similar.

- Gingival Inflammation

- Increased probing depths
- Progressive alveolar bone loss
- Peri-implant radiolucencies
- Increased mobility

The diagnostic evaluation should include:

- Radiographs - Periapicals and vertical bitewings films (interval same as the natural dentitions)
- Probing depths measured with a plastic probe
- Evaluation of:
    a. Bleeding
    b. Color/contour/consistency (tone)
    c. Occlusal Factors - Lateral forces or prematurities
    d. Prosthesis fit or movement so that the screw or cement seal remains tight.
    e. Individual implants in multiple unit prosthesis to evaluate for mobility – requires removal of the prosthesis (recommended every 2-3 years). Recommended be done by the dentist who originally placed the prosthesis.

NOTE: An increase in probing depths of 0.5-1.0 mm in the first year is to be expected and a 0.06-0.08 mm per year after is considered within normal limits.

The two major etiology factors found to be associated with break down of the coronal supportive tissues around an implant are bacterial infection (infectious failure) and biomechanical factors associated with an over load site (traumatic failure).

A. **Infectious Failure**: Two stages exist:
    1. Peri-Implant Mucositis - (early stages) When the inflammation around an implant is confined to the soft tissues.
    2. Peri-Implantitis - (advanced stages) When the inflammation has gone through the connective tissues into the bone. Typically associated with many of the clinical characteristics of periodontitis around natural teeth, including the micro flora.

B. **Traumatic Failures**
    1. Retrograde Peri-Implantitis - When micro-fractures within the bone occur due to:
        a. Premature implant loading
        b. Over loading
        c. Trauma
        d. Lateral forces

The clinical characteristics are periapical radiographic bone loss without the initial gingival inflammation seen with infection failure. The microflora are also more consistent with a periodontal healthy site.

Signs and symptoms of the over loaded implant vary with the implant system used. With the cylinder-type implant, the marginal areas develop more bone loss

which creates a crestal cupping, whereas with the thread-type implant, the bone loss is predominantly at the thread/bone interface.

C. **Combination**: Traumatic with infectious failure occurs when the traumatic result is present and is untreated. With the absence of a predictable peri-mucosal seal, the implant is more susceptible to the infectious results, and when both are present they lead to rapid bone loss and mobility.
D. **Treatment**: This section refers to sites with slight-to-moderate breakdown around the implant, and employs conservative therapeutic procedures to restore the health of the peri-implant tissues.

Infectious Failure: Two Phases

Phase One - To gain control of the acute bacterial infection and reduce the inflammation in the tissues.

1. Review POH: since implants are more susceptible to plaque associated infections, the patient's home care must be at its optimum.
2. Mechanical debridement at local factors. (see Appendix A: Maintenance of Dental Implant Guideline in the original guideline document.)
3. Subgingival irrigation to reduce pathogenic environment within the sulcus (i.e., chorohexidine).
4. Possible use of antibiotic local delivery systems such as doxycycline.
5. Systemic antibiotics such as amoxicillin or other stronger combinations (i.e., ciprofloxacin/metronidazole). Most studies suggest evaluation of the bacterial culture and sensitivity via microbiologic testing.

All the above is done in order to establish a healthy peri-implant site prior to going on to Phase 2.

Phase Two - Restoration of peri-implant soft tissue pocketing and/or to regenerate bony defects around the implant.

1. Surgery (oral surgery referral)

Traumatic Failures (Retrograde peri-implantitis): Two Phases

Phase One - Analysis of:

1. Prosthesis fit
2. The number and position of the implants
3. Occlusal relationships

Change in any of the above factors can arrest the progression of the peri-implant tissue breakdown, and must be done prior to going to the next phase.

Phase Two - The surgical correction of the peri-implant soft tissue pockets and/or to regenerate bone in osseous defects around the implant.

The Failed Implant

When the osseointegration has been severely reduced and the bone loss extends into the apical one-third of the implant, or has involved the apical vent holes, then the implant is deemed failed or nonrestorable and should be removed. Also, when an implant demonstrates mobility (which only occurs in the late stages) upon individual testing, then it too is deemed failed and also should be removed.

Recall Intervals Post Peri-Implantitis Therapy

Once a patient has exhibited peri-implantitis, they are at high risk for recurrence, and should be treated as a high risk patient.

Suggestions:

1. 3-4 month recalls
2. Alternating visits between the specialist and the general practice clinicians

Recall intervals may be lengthened or shortened based on the stability of the peri-implantitis condition and risk.

CLINICAL ALGORITHM(S)

Clinical algorithms are provided in the original guideline document for:

- Overall Perio Disease Flow
- Adult Plaque Related Periodontal Disease
- Plaque Related Gingivitis
- Adult Periodontitis with Slight/Moderate Loss of Periodontal Support
- Adult Periodontitis with Advanced Loss of Periodontal Support
- Supportive Periodontal Treatment
- Periodontal Therapy Appointment Management
- Refractory Periodontitis – Diagnostic Criteria
- Early-onset Perio Diseases
- Patient with a Tooth Predisposed to Recession
- Patient with Recession
- Peri-implant Disease

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of evidence supporting the recommendations is not specifically stated.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

- Decreased prevalence of periodontal diseases in HealthPartners Dental Group (HPDG) patients
- Reduced variability in how periodontal diseases are treated in the HPDG patient population

- Improved monitoring of patient outcome data resulting in improved care delivery
- Improved education of patients and providers

POTENTIAL HARMS

Development of antibiotic resistance and side effects of systemic therapy

CONTRAINDICATIONS

CONTRAINDICATIONS

- Chronic illness may contraindicate some types of periodontal therapy.
- During prophylaxis of patients with dental implants, proper instrumentation should be chosen so as not to compromise the biocompatible surface of the implant. Hand stainless steel curettes and ultrasonic devices are contraindicated for maintenance therapy.

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

An implementation strategy was not provided.

IMPLEMENTATION TOOLS

Audit Criteria/Indicators
Clinical Algorithm

For information about availability, see the "Availability of Companion Documents" and "Patient Resources" fields below.

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Living with Illness

IOM DOMAIN

Effectiveness
Patient-centeredness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

HealthPartners Dental Group and Clinics guidelines for the diagnosis and treatment of periodontal diseases. Minneapolis (MN): HealthPartners; 2006 Mar 9. 85 p.

ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2006 Mar

GUIDELINE DEVELOPER(S)

HealthPartners Dental Group - Professional Association

SOURCE(S) OF FUNDING

HealthPartners Dental Group

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

Not stated

FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: None available

Print copies: Available from HealthPartners, 8170 33rd Avenue South, P.O. Box 1309, Minneapolis, MN 55440-1309; Phone: (952) 883-5151; Web site: http://www.healthpartners.com

AVAILABILITY OF COMPANION DOCUMENTS

A list of potential measures is available in the original guideline document.

PATIENT RESOURCES

None available

NGC STATUS

This NGC summary was completed by ECRI Institute on August 7, 2007. The information was verified by the guideline developer on August 28, 2007. This summary was updated by ECRI Institute on July 28, 2008 following the U.S. Food and Drug Administration advisory on fluoroquinolone antimicrobial drugs.

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