GINGIVITIS AND PERIODONTAL DISEASES

The periodontium is composed of four structures: cementum, alveolar bone, periodontal ligament (PDL), and gingiva. Of these four periodontal structures, the gingiva is the only component that is visually accessible.

THE GINGIVA

The gingiva is the oral keratinized tissue that covers the alveolar processes and the cervical necks of the anatomic crown. Anatomically, the gingiva is divided into two zones: The free gingiva and the attached gingiva.

The free gingiva is considered "free" because it is not bound down to the underlying periosteum or tooth. Functionally, the free gingiva forms a cuff or collar of the gum tissue around the cervical neck of the anatomic crown of a tooth. Clinically, it extends from the gingival margin (the gum line) to the free gingival groove (which is the approximation of the base of the sulcus).

The attached gingiva is a firm, resilient tissue that is tightly bound down to the underlying periosteum and the tooth (hence called "attached"). Clinically, it extends apically from the free gingival groove to the mucogingival junction.

Gingival tissue in adults	Gingival tissue in children
The gingival tissues are normally light pink, although the color may be related to the complexion of the person, the thickness of the tissue, and the degree of keratinization.	The gingival color of the young child may be more reddish due to increased vascularity and thinner epithelium.
The surface of the gingiva of an adult appears more stippled than that of a child.	The surface of the gingiva of a child appears less stippled or smoother than that of an adult.
In the healthy adult, the marginal gingiva has a sharp, knifelike edge.	During the period of tooth eruption in the child the gingivae are thicker and have rounded margins due to the migration and cervical constriction of the primary teeth.

GINGIVITIS

It is inflammation involving only the gingival tissues surrounding the tooth. Microscopically, it is characterized by the presence of an inflammatory exudate and edema, some destruction of collagenous gingival fibers, and ulceration and proliferation of the epithelium facing the tooth and attaching the gingiva to it. Clinically it includes erythema, bleeding on probing and edema. Marginal gingivitis is the most common form of periodontal disease and starts in early childhood. Severe gingivitis is relatively uncommon in children.

Bacterial plaque is considered the major etiologic factor associated with gingivitis and more significant periodontal disease. Bacterial plaque, which is composed of soft bacterial deposits that adhere firmly to the teeth, consisting of dense masses of microorganisms embedded in an intermicrobial matrix (biofilm). It begins to form within 2 hours after the teeth are brushed while plaque microcolonies develop within 5 hours.

TYPES OF GINGIVITIS IN CHILDREN

Eruptive Gingivitis

It is gingival inflammation occurring around an erupting tooth. This transitory type of gingivitis is often observed in young children when the primary teeth are erupting. It also occurs in children in the 6- to 7-year age group when the permanent teeth begin to erupt. This increase in gingivitis apparently occurs because the gingival margin receives no protection from the coronal contour of the tooth during the early stage of active eruption, and the continual impingement of food on the gingivae exacerbates the inflammatory process.

During the eruptive phase, the epithelium displays degenerative changes at the site of fusion between dental and oral epithelia. These areas are vulnerable to plaque accumulation and sets up a bacterial reaction and since the child may be experiencing discomfort which will therefore make tooth brushing difficult leading to plaque accumulation and inflammation. This gingivitis, often localized and associated with difficult eruption, subsides after the teeth emerge into the oral cavity.

This inflammation is most commonly associated with the eruption of the first and second permanent molars, and the condition can be painful and can develop into pericoronitis or a pericoronal abscess. Mild eruption gingivitis requires no treatment other than improved oral hygiene. Painful pericoronitis may be helped when the area is irrigated with a counterirritant, such as Peroxyl. Pericoronitis accompanied by swelling and lymph node involvement should be treated with antibiotic therapy.

Dental Plaque–Induced Gingivitis

The degree of dental cleanliness and the condition of the gingival tissues in children are related. Gingivitis associated with poor oral hygiene is usually classified as early (slight), moderate, or advanced. Early gingivitis is quickly reversible and can be treated with good oral prophylactic treatment and instruction in tooth brushing and flossing techniques to keep the teeth free of bacterial plaque. Favorable occlusion and the chewing of coarse, detergent-type foods, such as raw carrots, celery, and apples, have a beneficial effect on oral cleanliness. Gingivitis is generally less severe in children than in adults with similar plaque levels.

Allergy and Gingival Inflammation

An enhanced gingival inflammatory reaction was observed in the allergic children during the pollen seasons. Although the significance of gingival reaction during short allergy seasons is difficult to assess, patients with complex allergies who have symptoms for longer periods may be at higher risk for more significant adverse periodontal changes.

Herpetic Gingivostomatitis

Herpes virus causes one of the most widespread viral infections. The primary infection usually occurs in a child younger than 6 years of age who has had no contact with the type 1 herpes simplex virus (HSV-1) and who therefore has no neutralizing antibodies. It is believed that 99% of all primary infections are of the subclinical type. The infection may also occur in susceptible adults who have not had a primary infection

Symptoms:

1) In some preschool children the primary infection may be characterized by only one or two mild sores on the oral mucous membranes, which may be of little concern to the child or may go unnoticed by the parents.
2) In other children the primary infection may be manifested by acute symptoms (acute herpetic gingivostomatitis).
3) The active symptoms of the acute disease can occur in children with clean mouths and healthy oral tissues.
4) The symptoms of the disease develop suddenly
5) Fiery red gingival tissues, malaise, irritability, headache
6) Pain associated with the intake of food and liquids of acidic content.

Characteristic oral findings:

Characteristic oral finding in the acute primary disease are:

1) The presence of yellow or white liquid-filled vesicles.
2) In a few days the vesicles rupture and form painful ulcers, 1 to 3 mm in diameter, which are covered with a whitish gray membrane and have a circumscribed area of inflammation.

3) The ulcers may be observed on any area of the mucous membrane, including buccal mucosa, tongue, lips, hard and soft palate, and the tonsillar areas.
4) Large ulcerated lesions may occasionally be observed on the palate or gingival tissues or in the region of the mucobuccal fold. This distribution makes the differential diagnosis more difficult.
5) An additional diagnostic criterion is a fourfold rise of serum antibodies to HSV-1. The lesion culture also shows positive results for HSV-1.

Treatment:

Treatment of acute herpetic gingivostomatitis in children, which runs a course of 10 to 14 days, should include specific antiviral medication and provision for the relief of the acute symptoms so that fluid and nutritional intake can be maintained.

1) The application of a mild topical anesthetic, such as dyclonine hydrochloride (0.5%) (Dyclone), before mealtime temporarily relieves the pain and allows the child to eat soft food. Another topical anesthetic, lidocaine (Xylocaine Viscous), can be prescribed for the child who can hold 1 teaspoon of the anesthetic in the mouth for 2 to 3 minutes and then expectorate the solution.
2) Because fruit juices are usually irritating to the ulcerated area, ingestion of a vitamin supplement during the course of the disease is indicated.

Although the treatments described may be useful, they are only palliative. **The mainstay of definitive therapy is** regular doses of specific systemic antiviral medication (acyclovir, famciclovir and valacyclovir) combined with systemic analgesics (acetaminophen or ibuprofen) during the course of the disease. Systemic antiviral medications inhibit viral replication in cells infected with the virus.

After the initial primary attack during early childhood, the herpes simplex virus becomes inactive and resides in sensory nerve ganglia. The virus often reappears later as the familiar cold sore or fever blister, usually on the outside of the lips. Thus the disease has been commonly referred to as **recurrent herpes labialis (RHL)**. However, approximately 5% of recurrences are intraoral. With the recurring attacks, the sores develop in essentially the same area. The recurrence of the disease has often been related to conditions of:

a) Emotional stress
b) Lowered tissue resistance resulting from various types of trauma.
c) Excessive exposure to sunlight may be responsible for the appearance of the recurrent herpetic lesions on the lip. Use of sunscreen can prevent sun-induced recurrences.

d) Lesions on the lip may also appear after dental treatment and may be related to irritation from rubber dam material or even routine daily procedures.

Dentists and dental auxiliaries without a history of herpetic lesions might benefit from serologic testing. Considering the occupational disability that often accompanies HSV-1 infection of the finger or eye, effective barrier protection for health professionals is important. Primary herpetic infection has been observed on the dorsal surface of the thumb of a pediatric patient. The child was a thumb sucker, and the acute primary infection was present in the mouth.

Acute Necrotizing Ulcerative Gingivitis

The infectious disease commonly referred to as acute necrotizing ulcerative gingivitis (ANUG) is rare among preschool children. The condition occurs occasionally in children from 6 to 12 years old, and is more commonly seen in young adults. It is an acute multiple bacterial infection of the gingivae. ANUG can be easily diagnosed because of the involvement of the interproximal papillae and the presence of a pseudomembranous necrotic covering of the marginal tissue.

The clinical manifestations of the disease include:

1) Inflamed, painful, bleeding gingival tissue
2) Poor appetite
3) Temperature as high as 40°C (104°F)
4) General malaise
5) A fetid odor.

Treatment:

1) The disease responds dramatically within 24 to 48 hours to subgingival curettage, debridement, and the use of mild oxidizing solutions.
2) If the gingival tissues are acutely and extensively inflamed when the patient is first seen, antibiotic therapy is indicated.
3) Improved oral hygiene, the use of mild oxidizing mouth rinses after each meal, and twice-daily rinsing with CH will aid in overcoming the infection.

Recurrent Aphthous Ulcer (Canker Sore)

The recurrent aphthous ulcer (RAU) also referred to as recurrent aphthous stomatitis (RAS) is a painful ulceration on the unattached mucous membrane that occurs in school-aged children and adults. The peak age for RAU is between 10 and 19 years of age. It has been reported to be the most

common mucosal disorder in people of all ages and races in the world. The description of RAU frequently includes the term **canker sores**

Characteristic oral findings:

1) Recurrent ulcerations on the moist mucous membranes of the mouth, in which both discrete and confluent lesions form rapidly in certain sites and feature a round to oval crateriform base
2) Raised reddened margins, and pain.
3) They may appear as attacks of minor or single, major or multiple, or herpetiform lesions.
4) They may or may not be associated with ulcerative lesions elsewhere.
5) Lesions persist for 4 to 12 days

Causes of Recurrent Aphthous Ulcer:

The cause of RAU is unknown. Some factors associated with RAU are:

1) Local and systemic conditions along with a genetic predisposition and immunologic and infectious microbial factors.
2) It is also possible that the lesions are caused by an autoimmune reaction of the oral epithelium.
3) Local factors include trauma, Injuries caused by cheek biting and minor facial irritations are probably the most common precipitating factors.
4) Allergy to toothpaste constituents (sodium lauryl sulfate)
5) Salivary gland dysfunction.
6) Nutritional deficiencies including deficiencies of iron, vitamin B12, and folic acid.
7) Stress may prove to be an important precipitating factor, particularly in stress-prone groups, such as students in professional schools and military personnel.

Treatment:

Numerous treatments have been recommended for RAU, but a completely successful therapy has not been found. Current treatment is focused on promoting ulcer healing, reducing ulcer duration and patient pain, maintaining the patient's nutritional intake, and preventing or reducing the frequency of recurrence of the disease.

1) Topical anti-inflammatory and analgesic medicines and/or systemic immunomodulatory and immunosuppressive agents have been used for RAU.
2) The primary line of treatment uses topical gels, creams, and ointments as anti-inflammatory agents. A topical corticosteroid is applied to the area with a mucosal adherent for example the

application of triamcinolone acetonide (Kenalog in Orabase) to the surfaces of the lesions before meals and before sleeping may also be helpful.

3) Topical rinses have also been helpful for the relief of RAU. Chlorhexidine (CH) mouthwash has been known to alleviate the symptoms of RAU. Dexamethasone elixir when swished is useful to treat ulcerations in areas of the mouth that are difficult to access.
4) The topical application of tetracycline to the ulcers is often helpful in reducing the pain and in shortening the course of the disease.

Acute Candidiasis (Thrush, Candidosis, Moniliasis)

Candida (Monilia) albicans is a common inhabitant of the oral cavity but may multiply rapidly and cause a pathogenic state when host resistance is lowered. Young children sometimes develop thrush after local antibiotic therapy, which allows the fungus to proliferate. The lesions of oral candidiasis appear as raised, furry white patches, which can be removed easily to produce a bleeding underlying surface. Neonatal candidiasis, contracted during passage through the vagina and erupting clinically during the first 2 weeks of life, is a common occurrence. This infection is also common in immunosuppressed patients.

Treatment:

Antifungal antibiotics control thrush.

1. **For infants and very young children**: a suspension of 1 mL (100,000 units) of nystatin (Mycostatin) may be dropped into the mouth for local action 4 times a day. Nystatin is nonirritating and nontoxic. Clotrimazole suspension (10 mg/mL), 1 to 2 mL applied to affected areas 4 times daily, is an effective antifungal medication. Systemic fluconazole suspension (10 mg/mL) is safe to use in infants at a total dosage of up to 6 mg/kg/day.
2. **For children old enough to manage solid medications allowed to dissolve in the mouth**: clotrimazole troches or nystatin pastilles are recommended because the therapeutic agent remains in the saliva longer than with the liquid medication.
3. **For children old enough to swallow**: systemic fluconazole (100-mg tablets) in a 14 - day course may be prescribed when the infection has not responded to topical antifungal agents.

Acute Bacterial Infections

The prevalence of acute bacterial infection in the oral cavity is unknown. Acute streptococcal gingivitis is an example of this type of infection. It is characterized by enlarged papilla, gingival abscesses, and painful, erythematous gingiva that bleed easily. Cultures show a

predominance of hemolytic streptococci. Acute infections of this type may be more common than was previously realized. The diagnosis is difficult to make, however, without extensive laboratory tests.

Treatment:

1. Broad spectrum antibiotics are recommended if the infection is believed to be bacterial in origin.
2. Improved oral hygiene is important in treating the infection.
3. As with any acute microbial oral infection, CH mouth rinses are also appropriate.