Smiles For Tomorrow

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- The authors report no conflicts of interest associated with this course. They have no relevant financial relationships to disclose.

Introduction

The topics reviewed in this continuing education course include: normal oral structures; common oral conditions; eruption patterns; dental caries and prevention; nonsurgical caries management options and orofacial trauma. Upon completion of this course the user will better understand appropriate evaluation, treatment, and preventive measures that should be instituted during infancy and continued on a regular basis to maintain optimal oral health.

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Overview

A child's oral health is an integral part of overall health. Appropriate evaluation, treatment, and preventive measures should be instituted during infancy and continued on a regular basis to maintain optimal health. This presentation is designed to offer practical pediatric oral health information and has been developed in cooperation with the *American Academy of Pediatric Dentistry.*

Topics in this presentation include:

- Normal Oral Structures
- Common Oral Conditions
- Eruption Patterns
- Dental Caries and Prevention
- Orofacial Trauma

These topics were selected to provide the background necessary to offer advice on a variety of conditions and to encourage early referral to the pediatric dentist.

Learning Objectives

Upon completion of this course, the dental professional should be able to:

- Understand appropriate evaluation, treatment, and preventive measures that should be instituted during infancy and continued on a regular basis to maintain optimal oral health.
- Discuss the common oral conditions (common acquired conditions, developmental conditions, and congenital conditions) of the pediatric patient.
- Explain the eruption patterns of the pediatric patient.
- Discuss the caries process which includes etiology and transmission, patterns of decay, caries risk assessment, and anticipatory guidance.
- Understand the purpose and indications for use of nonsurgical treatment techniques such as SDF and Hall crowns.
- Describe what to do for orofacial trauma in the pediatric patient.

Introduction

To begin this discussion, we will first look at some of the oral structures and associated conditions that may be noted during the examination.

Normal Oral Structure

Discussed in this section are the following normal oral structures:

- Frenum
- Buccal Mucosa
- Tongue
- Gingiva
- Alveolar Mucosa
- Masticatory Mucosa
- Palate
- Tooth Form

Normal Oral Structures

Frenum

Thin folds of mucous membrane can be seen at the midline of the upper and lower lips when the lips are retracted. These folds of tissue are the superior labial frenum and the inferior labial frenum.

Normal Maxillary (Superior) Frenum

Diastema

A diastema is considered normal in the primary and mixed dentition as part of normal dental development.

A diastema, or space, between primary or permanent central incisors is often associated with, though not necessarily caused by, a prominent superior labial frenum. The diastema can also be caused by an unerupted supernumerary, or extra tooth. An unwanted diastema persisting after eruption of the permanent canines (ages 10-13) should be evaluated for treatment options such as a frenectomy and/or orthodontic treatment.

Buccal Mucosa

The buccal mucosa covers the inner surface of the cheeks. Stensen's duct, the opening for the parotid gland, is located opposite the maxillary molars. Saliva from the parotid gland is secreted through this opening and comprises approximately 25% of the total resting salivary volume. Many common childhood infections like measles and chickenpox show early signs of disease on the oral mucosa.

Fordyce Granules are normal ectopic sebaceous glands found on the upper lip, buccal mucosa, retromolar area and anterior tonsillar pillar. They present as multiple yellow

Diastema During Primary Dentition

Diastema During Mixed Dentition

Diastema in an Eight-Month-Old

Buccal Mucosa

Cheek Bite

Chronic Cheek Biting

or whitish-yellow, slightly raised, tiny pinhead-sized spots.

Once the teeth have erupted, trauma from cheek biting is often seen in the buccal mucosa.

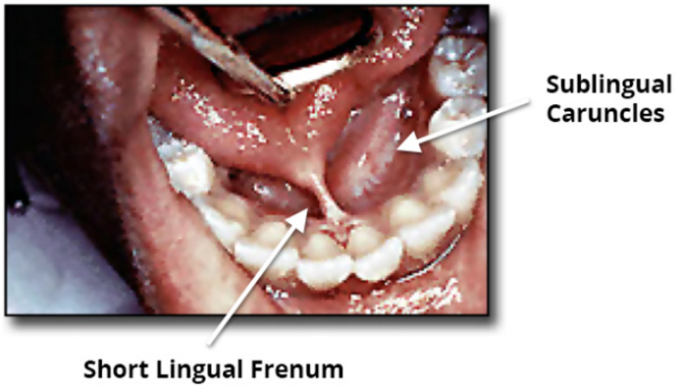
Tongue - Ventral Surface

Elevation of the tongue reveals the ventral surface. Extending from the ventral tongue to the floor of the mouth is a fold of tissue called the lingual frenum. At the base of the frenum attachment on the floor of the mouth are small, bilateral elevations known as the sublingual caruncles, duct openings for the sublingual and submandibular salivary glands.

Tongue - Dorsal Surface

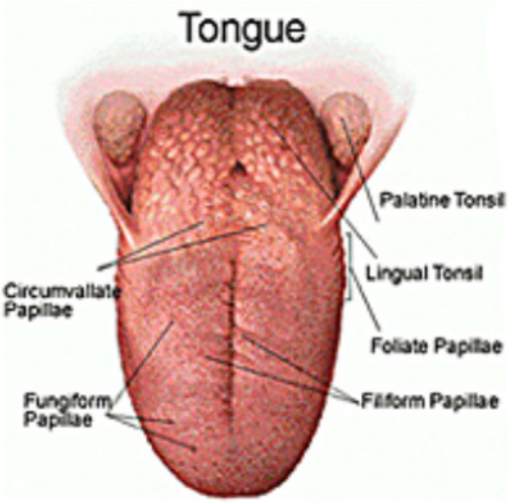
The dorsal surface of the tongue is covered with four types of papillae. Filiform are the most numerous papillae and cover the anterior two-thirds of the dorsum of the tongue. Although these papillae have no taste function, they may serve a tactile function. There are four basic taste sensations: sweet, salt, sour, and bitter. Specific regions of the tongue have specific associations with these sensations. The data is incomplete, but it's been shown that generally the tip of the tongue has receptors for sweet and salty sensation, and sour and bitter receptors lie near the back.

Ventral Surface



Fungiform papillae are singular knoblike projections scattered among the filiform papillae and may appear redder than the area around them. Circumvallate papillae are large, mushroom-shaped elevations that form an inverted V separating the anterior two-thirds from the posterior one-third of the tongue.

Foliate papillae are found on the lateral border of the tongue in the region of the circumvallate papillae and appear as parallel slits.



Dorsal Surface

Gingiva

The gingiva is divided into two distinct zones: free gingiva and attached gingiva. The free gingiva surrounds the tooth forming a sulcus (or crevice) next to the tooth. On the facial surface of the gingiva, a shallow depression called the free gingival groove separates the unattached gingiva from the attached gingiva. The attached gingiva is firm and tightly attached to the underlying alveolar bone. The width of the attached gingival is greater in adults than in children.

In a healthy state, the gingiva has a stippled appearance. It is also pale pink and free of bleeding. The color of the gingiva varies by the degree of vascularity, epithelial keratinization, pigmentation and thickness of the epithelium.

Gingiva

Alveolar Mucosa

The alveolar mucosa is contiguous with the attached gingiva. The alveolar mucosa is not attached tightly to the bone. The alveolar mucosa is shiny and not stippled. It is more reddened by the underlying blood vessels and thinness of the mucosa. Small blood vessels may be visible.

In the maxillary arch, the palatal gingiva does not change into alveolar mucosa but remains contiguous with the masticatory mucosa of the hard palate.

Masticatory Mucosa

The attached gingiva and tissue covering the hard palate are masticatory mucosa. These

Normal Pigmented Pediatric Gingiva

Normal Gingiva in Mixed Dentition

Alveolar Mucosa: Facial Aspect

Alveolar Mucosa: Palatal Aspect

tissues are parakeratinized or keratinized to withstand the forces of mastication.

The Palate

The transverse ridges, located at the anterior portion of the hard palate, are known as the rugae. A bulge of tissue at the midline, lingual to the central incisors, is the incisive papilla. Both the rugae and incisive papilla are susceptible to trauma - mainly burns from hot food. Treatment is palliative and usually involves avoiding further insult to tissues until healing is complete.

The soft palate extends posteriorly from the hard palate. The pendulum of tissue descending from the midline of the soft palate is the uvula. Immediately posterior to the hard palate, at the junction of the soft palate, are the palatine fovea, which are small pits or depressions at the midline.

The torus palatinus is a benign bone overgrowth that may be noted in some individuals at the midline of the hard palate. Torus palatinus is rarely seen in children before the second decade of life. It is a normal variant and often does not require treatment.

Normal Hard Palate

Tooth Form

Compared to permanent teeth, primary or deciduous teeth are smaller but have a more squat and bulbous appearance. The enamel of primary teeth is whiter, the dentin is thinner and the pulp chamber is proportionately larger. The enamel of permanent teeth has more yellow, brown, or gray tones.

Common Oral Conditions

Common oral conditions seen in the pediatric patient will be our next area for discussion.

Junction of the Hard and Soft Palate

Soft Palate and Uvula

Tooth Form: Primary Teeth

Tooth Form: Permanent Teeth

These conditions are divided into four broad categories:

- Common Acquired Conditions
- Developmental Conditions
- Congenital Conditions
- Common Congenital Conditions in Newborns

Common Acquired Conditions

Five common acquired conditions seen are:

- Candidiasis
- Glossitis
- Primary Herpetic Gingivostomatitis
- Aphthous Ulcers
- Discolored Teeth

Candidiasis

The pseudomembranous form of candidiasis is characterized by raised, white, curd-like plaques that leave a raw bleeding surface when scraped. Candidiasis often occurs in children with chronic conditions who are on long-term antibiotic therapy, as well as in children who are immunosuppressed.

The patient may be asymptomatic or may complain of a sore throat if the esophageal tissues are involved. In the newborn, secondary infection may occur. Lesions may be found on any mucosal surface. Topical or systemic antifungal agents are the treatment drugs of choice.

Glossitis

When the papillae are lost, the surface of the tongue may appear bald and shiny - a condition called glossitis. Usually a benign condition, it may change in size, location, and appearance, which is then termed benign migratory glossitis or geographic tongue. Glossitis may be associated with a number of disease processes and conditions: amyloidosis, celiac disease, chemical irritants, drug reactions, local infections (especially candidiasis), nutritional deficiencies (e.g., iron, folic acid, vitamin B12, riboflavin, niacin), pernicious anemia, protein-calorie malnutrition, sarcoidosis, Sjögren syndrome, systemic infections (e.g., syphilis), and vesiculo-erosive diseases (e.g., pemphigoid, pemphigus vulgaris, erythema multiforme, Stevens-Johnson syndrome).

Primary Herpetic Gingivostomatitis

Primary herpetic gingivostomatitis is caused by an initial infection with the herpes simplex

Candidiasis

Candidiasis

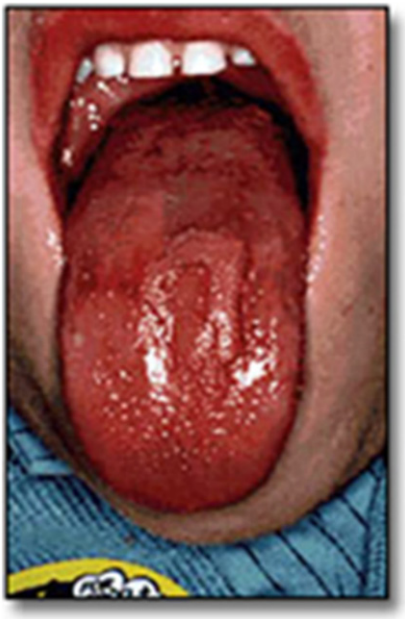
virus Type I and characterized by painful, erythematous, and swollen gingivae.

Multiple tiny vesicles first present on the perioral skin, vermillion border of the lips and the oral mucosa. The vesicles soon rupture into large, painful ulcerated areas.

Systemic symptoms of fever, malaise, and cervical lymphadenopathy typically occur first, followed by the appearance of vesicles that progress to ulcers. The most common age of occurrence is 6 months to 6 years. Lesions heal spontaneously in 1 to 2 weeks, with the acute phase lasting 7 to 10 days.

Treatment usually includes rest, antipyretics, and analgesics. A systemic antiviral agent may be prescribed in the early stages to shorten the durations of symptoms and viral shedding.

Dehydration may be a concern, especially in the younger patient, because food or drink on the oral tissues may cause pain. Nevertheless, hydration should be encouraged.



Glossitis

Information to the caregiver should include explanation of the contagious aspects of this disease. Antibiotics are contraindicated, unless secondary infection is present. Steroids are also contraindicated.

Aphthous Ulcers

Aphthous ulcers, or canker sores, are the most common recurrent oral ulcers in the U.S. There are three subtypes: minor, major, and herpetiform, with minor aphthous being the most commonly reported form. These ulcers are less than a centimeter in diameter and may occur as a single ulceration or in small groups on nonkeratinized mucosa, including the lateral and ventral aspects of the tongue, floor of the mouth, soft palate, and oropharyngeal mucosa. Major aphthae and herpetiform aphthae each occur in about 10% of cases. They appear as a yellowish white round to oval ulcer with an erythematous halo.

The etiology of aphthous stomatitis is unknown. Viral, bacterial, autoimmune, allergic, and nutritional causes have been suspected. Treatment is palliative, and the minor lesions heal in 7-10 days without scarring. Major aphthae, or periadenitis mucosa necrotica recurrens, requires 2-4 weeks to heal and may do so with submucosal scarring. Topical steroids

Primary Herpetic Gingivostomatitis: Extraoral

Primary Herpetic Gingivostomatitis: Intraoral

Aphthous Ulcer

Mild Fluorosis

Moderate Fluorosis

Severe Fluorosis

offer some hope for long-term management of recurrence.

Discolored Teeth

Intrinsic stain of tooth enamel may result from ingestion of excessive amounts of fluoride or prolonged systemic tetracycline administration during critical periods of tooth development. Fluoride is a compound that contains fluorine, a natural element. Fluorosis is associated with excessive fluoride ingestion during enamel formation. It is commonly seen as a mild discoloration in the presentation of a white lacy intrinsic stain and is permanent.

Discoloration does not occur from limited tetracycline use (such as from a 7-10 day course of the drug). Crown formation of permanent teeth is usually complete at age 8, after which tetracycline use will not result in discoloration of enamel.

Extrinsic stain is usually an accumulation of materials on the enamel surface from foods, medications, or microorganisms. Iron drops cause a black to grey discoloration that is easily removed by the dental professional. Other metal sulfides may also give a similar appearance.

Mild Tetracycline Stain

Moderate Tetracycline Stain

Severe Tetracycline Stain

Severe Tetracycline Stain

Stain from Iron Drops

Stain from Iron Drops

Developmental Conditions

Three developmental conditions seen are:

- Mucocele
- Ranula
- Fusion/Gemination

Mucocele

A mucocele develops when a minor salivary gland duct is injured or severed and the salivary gland secretion spills into the adjacent connective tissue. Granulation tissue forms in response to the secreted mucus and comprises the lining of a cyst like structure. Unlike a true cyst, the cystic space is not lined by epithelium. The most common location is the lower lip. The mucocele is bluish in color if located near the surface and normal in color if deeper in the tissues. Some mucoceles are short-lived lesions that burst spontaneously, leaving shallow ulcers that heal within a few days. Many, however, require local surgical excision with removal of adjacent minor salivary glands to minimize risk of recurrence.

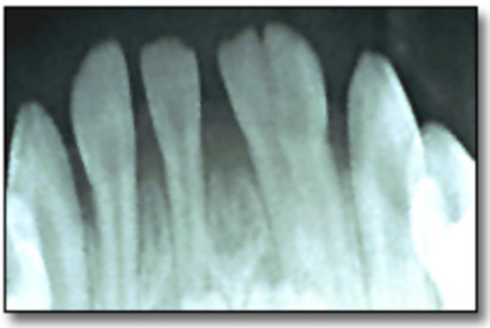
Ranula

A ranula is a mucocele formed under the tongue and often involves a major salivary gland. Oral ranulas usually occur in the first two decades of life and show slight predilection for females. The ranula will appear unilaterally

Mucocele

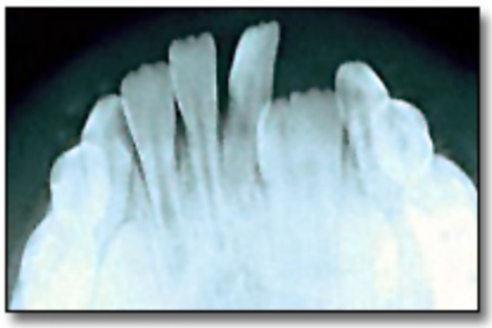
Ranula

Fusion



Fusion

Gemination



Gemination

in the floor of the mouth. Surgical management may be necessary.

Fusion/Gemination

Fusion is the union of two embryologically separate developing teeth. Gemination is the incomplete division of a single tooth bud. Fusion presents clinically as a large bifid crown (with a vertical crease). The geminated crown is smaller but also presents with a vertical crease. Clinically, fusion and germination are usually distinguished by counting the number of teeth in the arch. A deficiency in the normal complement, including the bifid crown, is usually fusion. Typically, fused teeth have two pulp chambers and two canals evident on a dental x-ray. A geminated tooth typically has one pulp chamber and canal.

Congenital Conditions

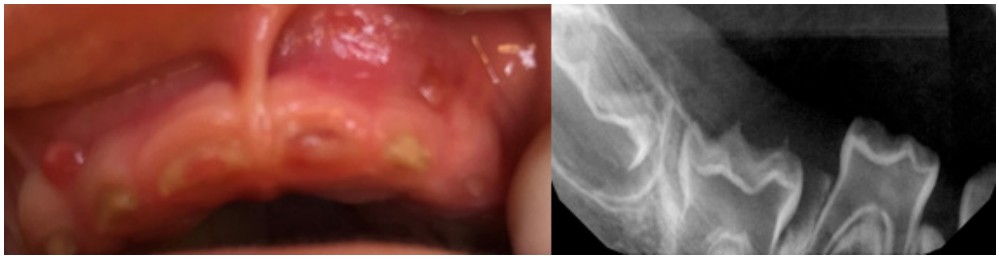
Seven congenital conditions seen are:

- Amelogenesis Imperfecta
- Dentinogenesis Imperfecta
- Ankyloglossia
- Submucous Clefts
- Congenital Epulis of the Newborn
- Natal Teeth
- Hemangioma

Amelogenesis Imperfecta

Amelogenesis imperfecta characterizes defects of the enamel resulting exclusively from

Amelogenesis in the Mixed Dentition



Clinical and Radiographic presentations of severe Shields Type III Dentinogenesis Imperfecta

genetic factors, which affect both primary and permanent dentitions. It has been suggested that the anomaly results from a defect in the enamel matrix proteins. It is mainly classified into four types according to clinical features and mode of inheritance: hypoplastic (Type I); hypomaturation (Type II); hypocalcified (Type III); and hypomaturation/hypoplasia/ taurodontism (Type IV).

Dentinogenesis Imperfecta

Dentinogenesis Imperfecta (DI) is a genetically heritable developmental defect of the dentin. There are three types of this disease classically characterized as a Shields type. Shields Type I occurs along with osteogenesis imperfecta ("brittle bone disease"), Shields Type II (Hereditary opalescent dentin) occurs alone, without osteogenesis imperfecta, and Shields Type III (Brandywine tri-racial isolate population). Both primary and permanent dentitions are affected. The teeth present with an amber or reddish-brown to blue-gray opalescent color and bulbous crowns with short, thin roots. The enamel over the poorly formed dentin can easily fracture in these teeth, often leading to severe wear of the dentition. Type I and Type II DI teeth usually present with pulpal obliteration radiographically. The rare Type III presents with characteristic bell-shaped crowns and shell-teeth radiographically due to severely enlarged pulp chambers and minimal dentin present (see x-ray).

Ankyloglossia

Ankyloglossia is a developmental anomaly of the tongue characterized by a short, thick lingual frenum resulting in limitation of tongue movement (partial ankyloglossia) or by the tongue appearing to be fused to the floor of the mouth (total ankyloglossia).

The significance and management of ankyloglossia are very controversial due to the lack of evidence-based studies to support surgical intervention. Frenectomy for functional limitations due to severe ankyloglossia should be considered on an individual basis.

Submucous Clefts

Congenital submucous cleft palate is often undetected on routine physical examination since it occurs beneath the surface of a normal

Ankyloglossia

Ankyloglossia Before Frenectomy

Frenectomy

Frenectomy

Bifid Uvula Associated with Submucous Cleft

mucosal covering. Often, a submucous cleft palate is associated with a bifid (cleft) uvula.

The anatomy of the submucous cleft is variable and includes partial or complete midline cleft of the soft palate musculature concealed by normal mucosa. Bony defects of the hard palate, also concealed by mucosa, vary from subtle notching at the midline of the posterior border of the hard palate to more extensive bony involvement extending further along the midline.

Submucous cleft palate is frequently asymptomatic, and the patient and clinician are not aware of its presence. Clinical symptoms, seen during early language development, present as hypernasal speech. Consultation with a speech pathologist should be considered.

[The removal of adenoids in a patient with normal speech and a bifid uvula should be approached with caution. An undiagnosed submucous cleft palate could be present. Adenoid tissue allows the anatomically compromised soft palate to close off the nasopharynx. Removing adenoids, however, may interrupt closure which would allow air to escape through the nose during speech and produce hypernasal speech.]

Congenital Epulis of the Newborn

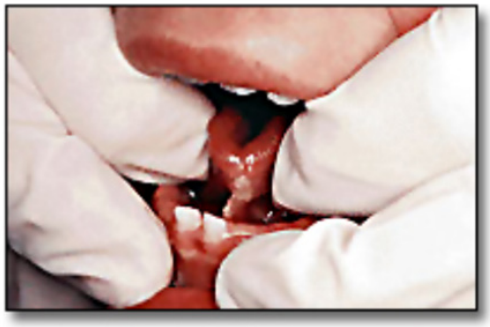
This benign submucosal lesion presents at birth, predominantly in females, and is frequently located in the maxillary anterior area. It is a localized, pedunculated, spongy mass with a smooth surface. A congenital epulis may be the same color as the surrounding mucosa. This condition may cause feeding or respiratory problems. The lesion may spontaneously regress, or excisional biopsy may be necessary. Recurrence is rare.

Congenital Epulis of the Newborn

Congenital Epulis of the Newborn

Natal Teeth

Natal Teeth



Irritation of Lingual Frenum

Riga-Fede Disease Ulceration

Natal Teeth

Natal teeth (present at birth), or neonatal teeth (erupting shortly after birth), are prematurely erupted teeth. In 85% of the cases, natal or neonatal teeth are normal primary teeth and should be allowed to remain in place unless they are quite mobile.

Riga-Fede disease is a persistent ulcer on the ventral surface of the tongue that is caused by the tongue moving over the sharp edges of natal or neonatal teeth. The infant may experience pain that discourages feeding. The treatment of Riga-Fede ulceration consists of smoothing the sharp edges of the teeth or removing the teeth as a last resort. The ulcers then heal spontaneously.

Hemangioma

Hemangiomas occur within the first decade of life, typically within the first year. A female predilection is evident. The lesions may present as localized or diffuse, red or blue, and flat or nodular in appearance. They are soft and compressible. They blanch when compressed. They are commonly found in the lip, tongue and buccal mucosa. Hemorrhage from trauma is a common problem.

Hemangiomas may undergo spontaneous involution or may be successfully treated without recurrence by surgical excision, the use of sclerosing agents, lasers, or cryotherapy.

Common Congenital Conditions in Newborns

Three common conditions seen in the newborn are:

- Epstein's Pearl
- Bohn's Nodule
- Dental Lamina Cyst

All three of these conditions are benign and generally require no treatment.

Epstein's Pearl

An Epstein's pearl is a white pearl-like lesion that is found along the midpalatal raphe. It is thought to be an epithelial remnant along the fusion line of the palatal halves.

Bohn's Nodule

A Bohn's nodule is a lesion believed to be related to salivary gland remnants. It appears as a raised area located on the lateral portion of the alveolar ridge or between the midpalatal raphe and alveolar crest in the maxilla.

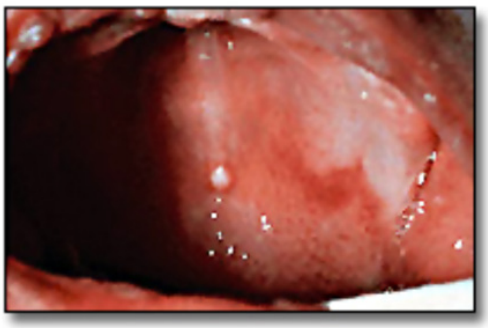
Dental Lamina Cyst

A dental lamina cyst is believed to be a remnant of the dental lamina, the embryologic precursors of teeth. It is epithelial in origin. It is found on the alveolar ridge of the maxilla and mandible. No treatment is necessary as the cyst usually disappears after three months.

Eruption Patterns

The age at which teeth erupt can vary widely. The primary teeth begin to form at 7 weeks in utero with mineralization beginning around the 4th month of fetal development. The eruption of teeth usually occurs symmetrically in each arch, with mandibular teeth erupting before the same maxillary teeth. The sequence of eruption is more important than the timing which varies greatly in both primary and permanent teeth. Variations of 6 months on either side of the usual eruption date may be considered normal for a given child. The first teeth to erupt are the primary mandibular central incisors at the approximate age of 5-8 months, with the maxillary central incisors following a month or two later.

Hemangioma



Epstein's Pearl

Bohn's Nodule

Dental Lamina Cyst

7 Months = First Primary Teeth Erupt

11 Months = 4 Erupted Primary Teeth

15 Months = 8 Erupted Primary Teeth

19 Months = 12 Erupted Primary Teeth

23 Months = 16 Erupted Primary Teeth

27 Months = 20 Erupted Primary Teeth

A simple way to remember approximate eruption times is the “7 + 4” guideline.

"7 + 4" Guideline

At approximately 7 months, the first primary tooth erupts.

By 11 months “7 + 4” there are 4 erupted primary teeth.

At 15 months, 4 more primary teeth will have erupted for a total of 8 erupted primary teeth.

By the age of 19 months, the child should have an additional 4 erupted primary teeth for a total of 12 erupted primary teeth.

By the age of 23 months, 16 primary teeth should be present.

By the age of 27 months, 20 primary teeth should be present.

Eruption Pattern - Permanent Teeth

The first permanent teeth to emerge are usually the maxillary and mandibular first molars. These molars will erupt behind the most posterior primary teeth - primary second

Primary Dentition

	Calcification begins at	Formation complete at	Eruption		Exfoliation	
			Maxillary	Mandibular	Maxillary	Mandibular
Central incisors	4th fetal mo	18-24 mo	6-10 mo	5-8 mo	7-8 y	6-7 y
Lateral incisors	4th fetal mo	18-24 mo	8-12 mo	7-10 mo	8-9 y	7-8 y
Canines	4th fetal mo	30-39 mo	16-20 mo	16-20 mo	11-12 y	9-11 y
First molars	4th fetal mo	24-30 mo	11-18 mo	11-18 mo	9-11 y	10-12 y
Second molars	4th fetal mo	36 mo	20-30 mo	20-30 mo	9-12 y	11-13 y

Permanent Dentition

	Calcification begins at	Crown (enamel) complete at	Roots complete at	Eruption*	
				Maxillary	Mandibular
Central incisiors	3-4 mo	4-5 y	9-10 y	7-8 y (3)	6-7 y (2)
Lateral incisors	Maxilla: 10-12 mo Mandible: 3-4 mo	4-5 y 4-5 y	11 y 10 y	8-9 y (5)	7-8 y (4)
Canines	4-5 mo	6-7 y	12-15 y	11-12 y (11)	9-11 y (6)
First premolars	18-24 mo	5-6 y	12-13 y	10-11 y (7)	10-12 y (8)
Second premolars	24-30 mo	6-7 y	12-14 y	10-12 y (9)	11-13 y (10)
First molars	Birth	30-36 mo	9-10 y	5.5-7 y (1)	5.5-7 y (1a)
Second molars	30-36 mo	7-8 y	14-16 y	12-14 y (12)	12-14 y (12a)
Third molars	Maxilla: 7-9 y Mandible: 8-10 y			17-30 y (13)	17-30 y (13a)

* Figures in parentheses indicate order of eruption. Many otherwise normal infants do not conform strictly to the stated schedule.

Logan WHG, Kronfeld R. Development of the human jaws and surrounding structures from birth to the age of fifteen years. J Am Dent Assoc 1933;20(3):379-427.

[www.aapd.org - Dental Growth and Development Guidelines]

6-year Molar

12-year Molar

Eruption Pattern: Permanent Teeth

Eruption Pattern: Permanent Teeth Anterior

Eruption Bulge

Eruption Hematomas

Eruption Hematomas

molars. The permanent molars are referred to by their anticipated age of eruption. The first molars are called the six-year molars, and the second molars are referred to as the twelve-year molars.

The first permanent molars usually erupt between 5.5 and 7 years of age. Their eruption may be accompanied by or preceded by the exfoliation of the mandibular central incisors. Between the ages of 6 and 7, the mandibular permanent incisors erupt with the maxillary incisors following at ages 7 through 9.

The anterior permanent teeth develop behind (lingual or palatal to) the primary teeth, and the permanent premolars (bicuspids) develop beneath and between the roots of the primary molars they replace. Often a "bulge" on the gingiva can be seen prior to the eruption of a permanent incisor or canine. The bulge is the crown of the erupting tooth.

Eruption

Teething is a natural process that occurs as the tooth penetrates the gum. It may cause increased drooling and the desire to bite or chew on things. There may be mild pain associated with teething, but there is no evidence that high fevers, diarrhea, facial rashes, or sleep problems are caused by teething.

For symptom relief, an age-appropriate dose of oral analgesics and teething rings for the infant to chew on may be used as needed. Topical anesthetic gels or creams and other homeopathic treatments for teething may cause harm to the infant and should be avoided. Specifically, use of topical benzocaine is contraindicated in children younger than

Ectopic Eruption

Severe Early Childhood Caries (ECC)

two years of age due to an increased risk of methemoglobinemia.

Eruption Problems

Eruption problems frequently noted and covered in this section are:

- Eruption Hematoma
- Over-retained Primary Teeth
- Disturbances in Exfoliation/Eruption
- Early or Late Loss of Primary Teeth

Eruption Hematoma

An eruption hematoma presents as a bluish swelling over an erupting tooth and is usually asymptomatic. The follicle surrounding the erupting tooth becomes filled with blood-tinged fluid. Eruption hematomas usually rupture spontaneously and require no treatment. Treatment is indicated when eating is impaired by the size of the hematoma or if pain is present.

Over-retained Primary Teeth

Primary teeth may be retained beyond the normal exfoliation time. One reason for "over-retention" is the lack of a permanent successor. Another cause of retention is ankylosis, a condition in which the root surface becomes fused to the alveolar bone. The primary teeth most commonly ankylosed are the mandibular primary first and second molars, followed by the maxillary primary first and second molars. For some patients, extraction of the ankylosed tooth may allow for the eruption of a succedaneous tooth. Bruxism has also been identified as a factor in over-retention of primary teeth.

Disturbances in Exfoliation/Eruption

Ectopically erupting permanent teeth follow an abnormal path. This may cause either premature root resorption and early loss of erupted primary teeth or the opposite, when root resorption does not occur and primary teeth are retained. Ectopic eruption may be associated with any tooth. Crowding may be seen in the lower anterior region when the permanent incisors erupt lingual to the primary incisors.

Early or Late Loss of Primary Teeth

Early or late loss of primary teeth is sometimes associated with systemic conditions. Cleidocranial dysostosis, Trisomy 21 (Down Syndrome), hypothyroidism, and hypopituitarism are conditions associated with retention of primary teeth. Conditions associated with premature exfoliation are hypophosphatasia, Langerhans cell histiocytosis, hyperthyroidism, and cyclic neutropenia.

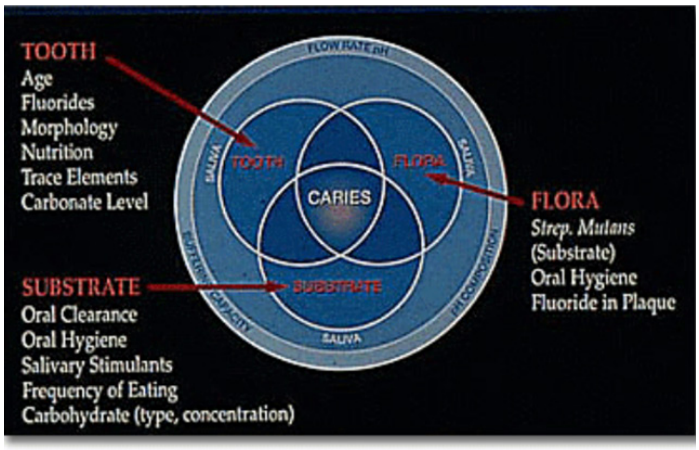
Dental Caries and Prevention

Dental Caries

The Centers for Disease Control and Prevention reports that caries is the most prevalent infectious disease in our nation's children. Early childhood caries (ECC) can be a particularly virulent form of caries, beginning soon after primary tooth eruption, usually developing first on smooth surfaces, progressing rapidly, having a lasting detrimental impact on the dentition.

Newer theories on the etiology of tooth decay and transmission of causative organisms highlight the fact that dental caries is an infectious and communicable disease. This review of the caries process covers:

Dental Caries Etiology:



- Etiology and Transmission
- The Caries Process
- Patterns of Decay
- Caries Risk Assessment
- Anticipatory Guidance

Etiology and Transmission

In the simplest terms, the process of dental caries can be illustrated by this Venn diagram:

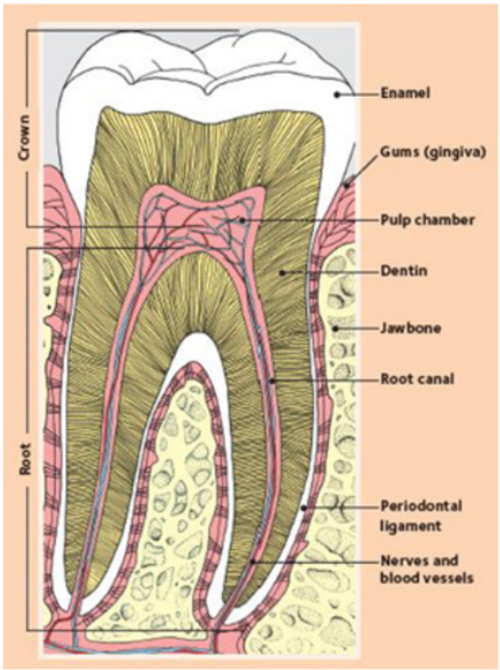
- Susceptible tooth
- Presence of bacteria
- Access to fermentable carbohydrates and cooked starches
- Time

Bacteria use dietary fermentable carbohydrates (principally sugars and cooked starches) as a substrate for acid production, resulting in a lowering of the pH of the area. Species of Streptococcus and Lactobacillus are most often implicated in the caries process.

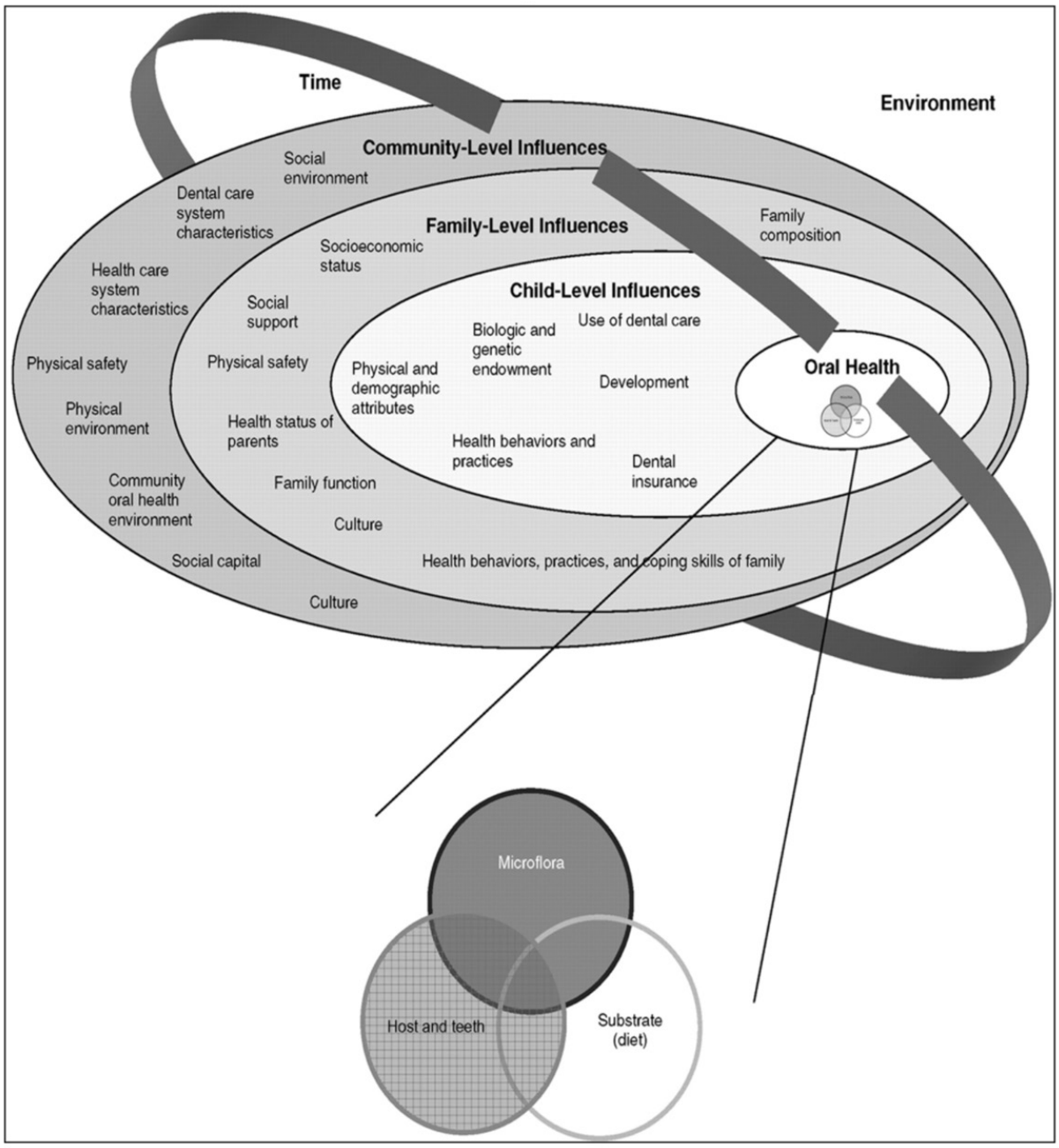
However, we now know that caries is a multifactorial, chronic disease with many outside influences.

Streptococcus mutans acquisition is usually associated with the eruption of the first primary teeth. However, *S. mutans* may appear as an oral microbe in the infant prior to the eruption of primary teeth primarily through direct transmission between caregiver and child. Transmission from caregivers with high levels of *S. mutans* can be delayed or prevented by the caregiver initiating a prevention program for that includes meticulous oral hygiene.

***Streptococcus Mutans* Transmission**

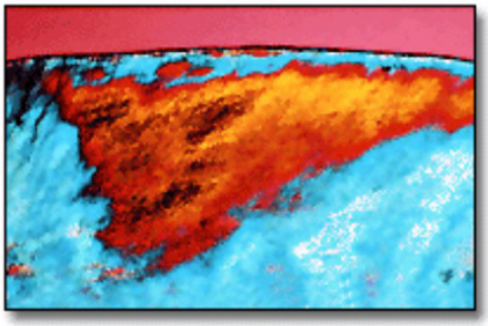


Tooth Structure

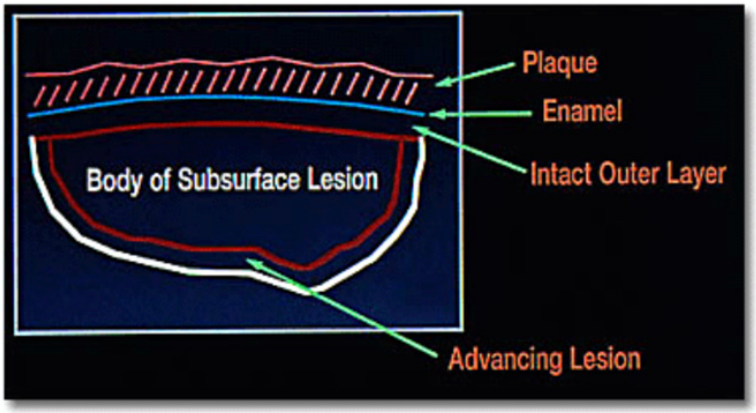


Influences on Children's Oral Health: A Conceptual Model

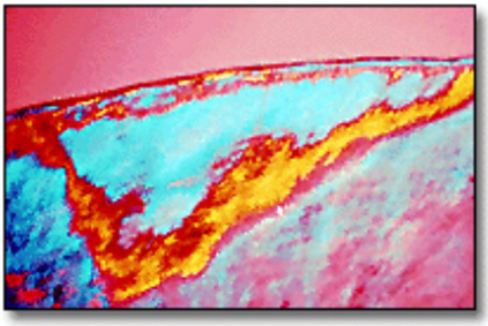
Source: Fisher-Owens SA, Gansky SA, Platt LJ, et al. Influences on children's oral health: A conceptual model. Pediatrics. 2007;120(3):e510-20. doi: 120/3/e510 [pii].



Demineralized Enamel Micrograph



Demineralized Enamel Illustration



Remineralized Enamel
(Note: Intact surface layer and remineralization area).

The Caries Process

Enamel is composed of mineralized crystals in an organic matrix. This unique structure provides channels through which minerals, such as calcium and fluoride, and acids can flow.

We no longer think of dental caries as a simple, uncontrollable, linear progression from acid demineralization to a frank clinical lesion. We now know the caries process is dynamic and involves continuous demineralization with intermittent remineralization.

Normally, equilibrium exists between mineral loss (demineralization) and mineral gain (remineralization). Demineralization occurs when acid lowers the pH at the tooth surface. This causes calcium, phosphate, and other minerals to diffuse out of the enamel and creates a subsurface lesion.

Remineralization represents the opposite reaction. During remineralization, mineral is redeposited in the subsurface lesion. Fluoride, even in low concentrations, can enhance the remineralization of enamel and may actually result in a crystal structure that is more caries-resistant.

In this process of demineralization and remineralization, enamel caries can actually be reversed provided the outer surface layer of the enamel is still intact. Once the outer surface layer is lost, the potential for remineralization is also lost, and the tooth must be restored to achieve its previous form.

Role of Saliva

The flow, dilution, buffering, and remineralizing capacity of saliva are also recognized to be critical factors that affect, and in some ways regulate, the progression and regression of the disease. If the oral environment is balanced and favorable, saliva can contribute to strengthening of the tooth by supplying the components to help build strong enamel structure.

Patterns of Decay

Basic patterns of decay will be reviewed in this section. These patterns are:

- Early Childhood Caries (Patterns of Decay)
- Pit and Fissure Caries
- Smooth Surface Caries
- Caries and Infection

Left untreated, caries can lead to pain, abscess formation, and even life-threatening, consequences.

Early Childhood Caries

Early childhood caries (ECC) is a multifactorial subset of caries that has influences other than

Early Childhood Caries

diet and oral hygiene. Originally thought to be only due to extended nursing or bottle-feeding, ECC is now known to have behavioral, socioeconomic, and psychosocial factors. ECC is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing teeth (due to caries), or filled tooth surfaces in any primary tooth in a child age six or younger. In children younger than 3 years of age, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC). S-ECC also is defined as one or more cavitated, missing teeth (due to caries), or filled smooth surfaces in primary maxillary anterior teeth in a child ages 3 through 5, or decayed, missing, or filled score of ≥4 (age 3), ≥5 (age 4), or ≥6 (age 5).

ECC may initially affect the primary maxillary incisors of children who are routinely given a bottle or sippy-cup containing a fermentable carbohydrate throughout the day, at night or nap times, or who breastfed (at will) after teeth begin to erupt and other dietary carbohydrates have been introduced. As the child sleeps, pools of fermentable liquid collect around the teeth, especially the maxillary incisors, which exacerbates the decay process. Upper primary incisors are in a saliva-deficient area and

Pit and Fissure Caries

Smooth Surface Caries

therefore are more susceptible to acid attack. Lower anterior teeth are rarely affected unless the decay becomes rampant. If detected early, further demineralization can be minimized and

Facial Cellulitis Due to Untreated Dental Abscess

may be slowed or reversed by modifying diet and oral hygiene practices and by introducing fluoride.

Pit and Fissure Caries
Dental caries can readily begin on biting surfaces of posterior teeth, in pits, fissures, and defects of the enamel. The enamel at the base of pits and fissures is frequently thin. Additionally, the plaque collected in these areas is not easily removed by normal oral hygiene measures such as tooth brushing.

Smooth Surface Caries
Smooth surface caries occurs where there is no pit, groove, or other fault on a tooth. It occurs in areas where bacterial plaque collects, such as between teeth, along the gumline, and in difficult-to-clean areas.

Caries and Infection
If left alone with the etiology still present, a carious tooth surface typically will continue to demineralize. Once the demineralization process has exposed the pulp, which is the neurovascular bundle at the center of each tooth, an infection can result. An untreated dental abscess can lead to the rapid development of cellulitis, which is dissemination of the infection into adjacent soft tissues. Cavernous sinus thrombosis, or dissemination of the infection into the cerebral circulation, and Ludwig's angina, a dissemination of a cellulitis that can close off the respiratory tract, pose life-threatening complications, which can also result from an untreated dental abscess.

Caries Risk Assessment

While a significant percentage of the U.S. child population remains caries-free, a caries risk assessment should be a part of each child's overall health assessment because all children are at some risk. When determining a child's risk for developing caries, clinicians should consider:

- Biological Factors
- Protective Factors
- Clinical Findings
- Anticipatory Guidance

Biological Factors

1. **Family History**
   A family history of dental caries increases a child's risk for decay. The caries history of the mother or the primary caregiver should be carefully evaluated to determine if the child has an increased risk. The caregiver's knowledge of dental health and attitude toward dental care or health literacy should also be assessed. Children from lower socioeconomic families may have a higher risk for developing dental caries. In addition, children with immigrant backgrounds may have a higher caries rate than non-immigrants.

Sleep Time Habits

Medications

2. **Dietary Habits**
   Types, consistency, and frequency of solid and liquid food intake should be evaluated for cariogenic (caries-causing) potential. On-demand bottle feeding with a fermentable carbohydrate, on-demand breast-feeding and frequent consumption of non-mealtime sugar-containing snacks daily increase the caries risk by increasing the amount of time oral acid is formed and therefore the chance for enamel demineralization.

   Allowing a child to fall asleep with a bottle containing natural or added sugar increases a child's risk for developing early childhood caries.

3. **Medical Conditions**
   An accurate and up-to-date medical history is essential for caries risk assessment. Children with special health care needs are at increased risk for oral diseases including caries. Those with mental, developmental, or physical disabilities who do not have the ability to understand and assume responsibility for or cooperate with preventive oral health practices may be more susceptible. Children with compromised immunity or cardiac conditions associated with endocarditis may be especially vulnerable to the effects of oral diseases.

   Pediatric medications may contain sucrose and children who regularly take such medications for chronic conditions need to be on a more intensive prevention program. Children undergoing radiation therapy may have reduced salivary flow which warrants the highest attention toward preventing caries.

Protective Factors

The most studied factors that are protective of dental caries include systemic and topical fluoride, sugar substitutes, and tooth brushing with fluoridated toothpaste. A dental home providing regular care and prevention is included as a protective factor in many caries-risk assessment models.

1. **Fluoride**
   Using fluoride for the prevention and control of decay is proven to be both safe and effective. Caries risk assessment should include the dosage and frequency of fluoride exposure from various sources such as water, dietary supplements, rinses, toothpastes and other dietary sources of fluoride like beverages and processed food. The primary water source (which may not be the child's home) should be identified and assessed for fluoride. Professional topical fluoride applications performed semiannually reduce caries risk.

2. **Oral Hygiene**
   At home oral hygiene and plaque control remain essential elements for oral health. Children's teeth should be brushed twice daily with fluoridated toothpaste and a soft, age-appropriate sized toothbrush. Flossing may be useful for plaque removal in areas difficult to access with a toothbrush.

3. **Additional At-home Preventive Measures**
   Sugar substitutes can help decrease a child's risk for caries. Topical fluoride rinses may be helpful but require good compliance and the ability to control the rinse and not swallow.

4. **Dental Home**
   The dental home (regular periodic care by the same practitioner) benefits oral health through an emphasis on prevention and early intervention. The American Academy of Pediatric Dentistry and the American Dental Association recommend establishment of a dental home by a child's first birthday.

Clinical Findings

A dental examiner should evaluate the dentition for caries and for restorations or missing teeth due to caries. The best tool to predict future caries is past caries experience, and existence of caries or restorations suggest elevates caries risk. The teeth should be examined for smooth surface white spot lesions, pit and fissure anatomy of the biting surfaces of posterior teeth, and enamel defects. Children with white spot lesions should be considered at high risk for caries since these are pre-cavitated lesions indicative of caries activity. Stained pits and fissures and developmental enamel defects can be risk indicators.

Defective restorations and intraoral appliances that harbor cariogenic bacteria increase a child's risk for developing caries.

Plaque accumulation also is strongly associated with caries development in young children. As a corollary to the presence of plaque, a child's *mutans streptococci* levels may be valuable in assessing risk, especially in preschool children, but cost and temporal delay in receiving results may inhibit its adoption into routine clinical practice.

Anticipatory Guidance

Teething and its signs, mouthing objects, nonnutritive sucking, sequence of tooth eruption, and injuries to newly erupted primary incisors as children learn to walk are just a few of the subjects that can be covered in helping parents anticipate potential oral health problems. Appropriate use of the nursing bottle, adequate fluoride exposure, and parents cleaning newly erupted teeth are guiding concepts that can help infants and toddlers toward good oral health.

Initial Dental Visit

The American Academy of Pediatric Dentistry recommends that every infant should receive an oral health risk assessment from their primary health care provider or qualified health care professional by 6 months of age. This initial visit should consist of the following:

- Health of oral cavity
- Assessing the patient's risk of developing oral disease
- Providing education on infant oral health
- Evaluating and optimizing fluoride exposure

Parents or caregivers should establish a dental home for infants by the child's first birthday. The dental home establishes a therapeutic relationship, familiarizes a child with dental care, provides a source of emergency care and creates a care program unique to that child and family. This provides

Initial Dental Visit

Fluorosis

Table 1. AAPD Recommended Supplemental Fluoride Dosage Schedule.

Dietary Fluoride Supplementation Schedule			
Age	**<0.3 ppm F**	**0.3 to 0.6 ppm F**	**>0.6 ppm F**
Birth to 6 months	0	0	0
6 mo to 3 years	0.25 mg	0	0
3 to 6 years	0.50 mg	0.25 mg	0
6 to at least 16 years	1.00 mg	0.50 mg	0

time-critical opportunities to implement preventive health practices and reduce the child's risk of preventable dental/oral disease. Should treatment be required, appropriate recommendations and referrals can be made at that time.

Fluoride

Fluoridation of community water supplies began in 1945 and has been proven to be the most cost effective way to reduce caries rates. Fluoridated water provides a brief topical effect followed by systemic effects of increased fluoride in saliva and plasma surrounding developing teeth. Epidemiologic data within the last half-century indicate initial reductions in caries rates of 55 to 60% and recent data still shows caries reduction of approximately 25%. About three-quarters of the United States population currently has access to fluoridated tap water. Importantly, most brands of bottled water do not contain optimal fluoride levels.

In areas where the water does not contain optimal levels of fluoride, and after careful consideration of the other dietary sources of fluoride and the child's age (i.e., stage of dental development), fluoride supplements may be prescribed for children at high risk of caries. Decisions concerning the administration of additional fluoride should be based on the unique needs of each patient and fluoride supplements should not be routinely prescribed to children at high caries risk, as the child may be adequately exposed to fluoride from other diet sources.

The table shows the current fluoride supplement recommendations. Although infants can be given fluoridated water from birth, systemic fluoride supplements are not recommended for any infant younger than 6 months of age.

Topical Fluoride

The use of topical fluorides may result in a significant reduction in caries as the fluoride gets integrated into the enamel matrix, hardening the structure and making it more resistant to demineralization. Topical application of fluoride is available via:

- Fluoride-containing toothpastes
- Professionally-applied topical fluoride treatment
- Over-the-counter rinses for home use
- Prescription rinses and gels for home application

Over-the-counter fluoride mouthrinses are not recommended for preschool aged children due to risk of swallowing excess. Fluoride mouthrinses or brush-on gels may be

recommended for school-aged children with active caries or at high risk for caries. Indicators of increased caries risk may include:

- orthodontic/prosthodontic appliances
- reduced salivary function
- inability to clean teeth properly
- dietary risks
- siblings with caries
- high oral levels of cariogenic bacteria

Over-the-counter rinses are designed for daily use. Higher concentration fluoride prescription rinses and gels are designed for weekly use.

Using small amounts of fluoride on a routine basis can help prevent tooth decay. Too much fluoride could cause fluorosis of developing enamel. Fluorosis usually is mild, with tiny white specks or streaks that often are unnoticeable. Development of fluorosis depends on the amount, duration and timing of excessive fluoride intake.

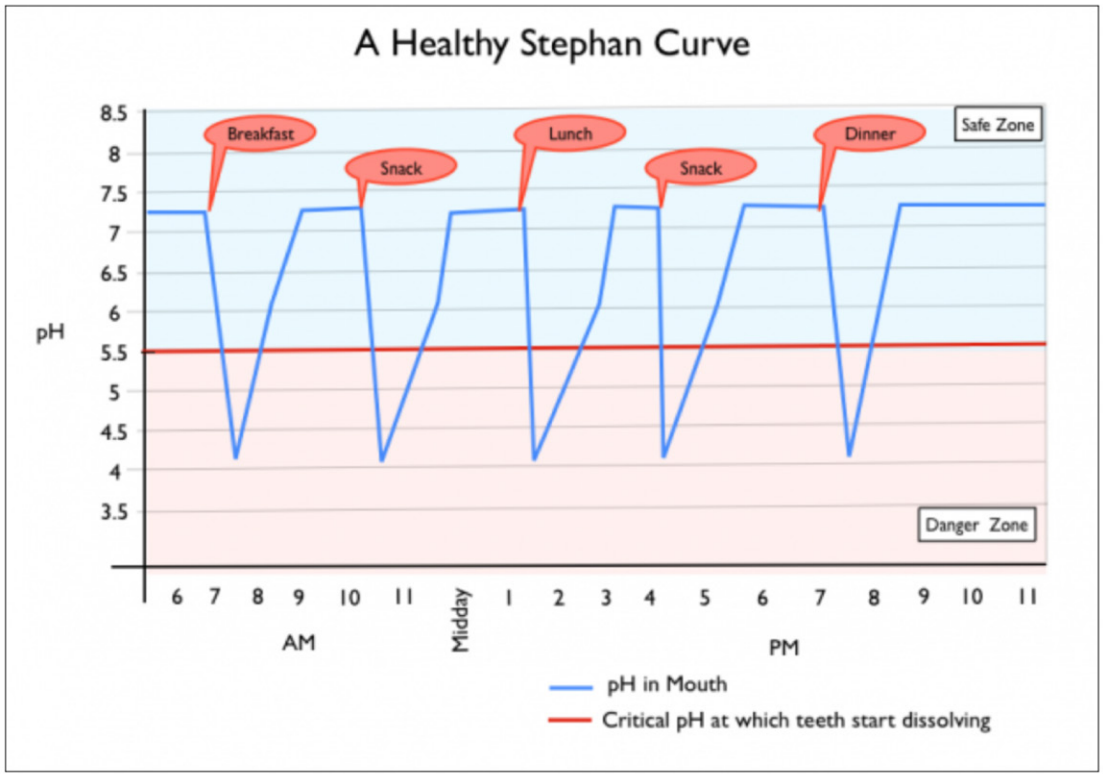
Toothpaste can be used to deliver fluoride to the tooth surface. The use of a fluoride toothpaste should always be supervised in children. For those under three years old, a smear or rice size amount of fluoride toothpaste twice a day is recommended by the American Academy of Pediatric Dentistry and American Dental Association. An amount equal to the size of a pea should be used twice a day for children ages 3 to 6 years of age. When using these small amounts, rinsing with water is discouraged after brushing to allow the fluoride a maximum topical effect.

Fluoride products should be kept in childproof storage areas. This includes not only supplements but toothpastes, fluoride rinses, and gels.

Diet

All solid and liquid foods containing carbohydrates bio-available to bacteria are potentially cariogenic. Acid-forming bacteria, such as *Streptococcus mutans*, begin the immediate breakdown of sucrose from food, potentially contributing to dental caries.

Diet and Dental Caries:



Sugars on the tooth surfaces are converted to acid within seconds of ingestion. The acid acts to demineralize the tooth. Left undisturbed, the acid produced from the ingestion of a sugar can remain in the oral cavity up to 2 hours. During this acid attack, the pH level of plaque may drop from a normal range of 6.2-7.0 down to a pH of 5.2-5.5, the level at which demineralization can occur.

Consumption of caries-producing solid and liquid foods will lower the oral pH to a level that makes the enamel susceptible to caries. These frequent exposures can lower the pH to demineralizing levels for several hours per day.

The texture of foods, likewise, influences the length of time demineralization can occur. Foods that are more retentive and slower to dissolve will remain on the tooth surface for a longer time. Sticky, retentive snacks and slow dissolving carbohydrates, such as raisins, dried fruit, fruit rolls, bananas, caramels, jelly beans, or peanut butter and jelly sandwiches can lead to caries when consumed on a regular basis. Less retentive foods such as raw crisp fruits (apples, for example) and raw vegetables stimulate saliva flow while also mechanically removing plaque.

In order to eliminate or reduce caries risk in their infant or young child, caregivers should understand the relationship between diet and dietary habits and dental caries. After the eruption of the first primary tooth, prevention of caries is possible by restricting bottle/breast feeding to normal meal times. The caregiver should be advised to establish a pattern of three regular meals a day. In between-meal snacks should be limited and be foods of high nutrient density with low cariogenicity, such as meats, eggs, cheese, raw vegetables, fresh or water packed fruit, popcorn, and nuts.

Oral Home Care

This section will review:

- Oral Hygiene
- Tooth Brushing Technique
- Flossing
- Early Childhood Caries (Oral Home Care)
- Nonnutritive Sucking Habits

Caregivers should be counseled as to their role in infant oral hygiene. Information and guidance should be made available to plan a daily routine of plaque removal. This can be incorporated into the daily routine at bath time. Gingivitis, the presence of gingival inflammation without bone loss, can occur in children. A color change from pink to red, accompanied by bleeding and a loss of stippling of the gingival tissues, can be noted.

The most common cause of gingivitis is undisturbed, accumulated plaque at the gingival third of the tooth. Gingivitis is reversible. Instituting consistent and thorough daily plaque removal, the gingiva will return to good health.

Oral Hygiene

Oral hygiene measures should be implemented no later than the time of eruption of the first primary tooth. Cleansing the infant's teeth as soon as they erupt with either a washcloth or soft brush will help reduce bacterial colonization. The use of a systematic approach to tooth cleaning should be encouraged to ensure that all surfaces of all erupted teeth are cleaned.

Gingivitis

Oral Hygiene Should Begin with the Eruption of the First Tooth

Position the Child for Optimal Stabilization and Intraoral Visibility

Disclosed Plaque

Disclosed Plaque

Tooth Brushing Technique
The bristles of the brush should be angled toward the gingival margin, with light pressure applied in a circular motion. The occlusal surfaces can be brushed with a back-and-forth motion. Each area brushed should slightly overlap the previous section.

Positioning the child to assure stabilization and ease of access to the oral cavity can be accomplished by using a changing table or by placing the child's head in the lap of the caregiver. As the infant gains more control of the neck muscles, a more face-to-face approach may be attempted. Until that time, support for the head and neck are vital. By cradling the head against the caregiver's chest, one hand can be free to support the chin and one hand free for brushing.

Toothbrushes Designed for Children

Visibility
The back of the brush or a finger can be used to retract the cheek and tongue for access to posterior teeth. Finger retraction of the lip will provide access to anterior areas.

Children will show signs of wanting to clean their own teeth by the age of 24 months. The fine-motor skills necessary for the child to adequately perform this activity are not yet developed at this age. A child at age 10 years has a similar ability to brush as an adult but before that age, a caregiver should either

Flossing Can be Initiated as Needed

brush or supervise brushing and make an assessment of the child's skills.

Toothpaste can be used as a means to deliver fluoride to the tooth surface. The use of a fluoridated toothpaste should always be supervised in children under age 6. For those under three years old, a smear or rice size amount of fluoridated toothpaste twice a day is recommended by the American Academy of Pediatric Dentistry and American Dental Association. A very small amount of fluoridated toothpaste, equal to the size of a pea, should be wiped onto the toothbrush by the caregiver for children over aged 3 to 6 years of age twice a day. Caution should be taken to prevent the swallowing of toothpaste during critical periods of enamel formation, which is ages 0-8 years.

At age 3 to 4, a disclosing tablet or solution can be used with supervision. The stained plaque may help the child visualize the areas that need to be cleaned along with the effort and brush manipulations necessary to accomplish this task.

Allowing children to choose their own toothbrush from an assortment of soft nylon-bristle brushes may stimulate their interest. Child toothbrushes are available with age-appropriate bristles and handle designs. Setting aside special times of day for brushing, likewise, can help establish the importance of oral hygiene. Children can be given more independence in brushing as they mature. A child's dedication to other life tasks and ability to perform activities like using a knife and fork, tie shoes independently, or wash dishes, may be indicative of brushing dexterity and ability.

Flossing

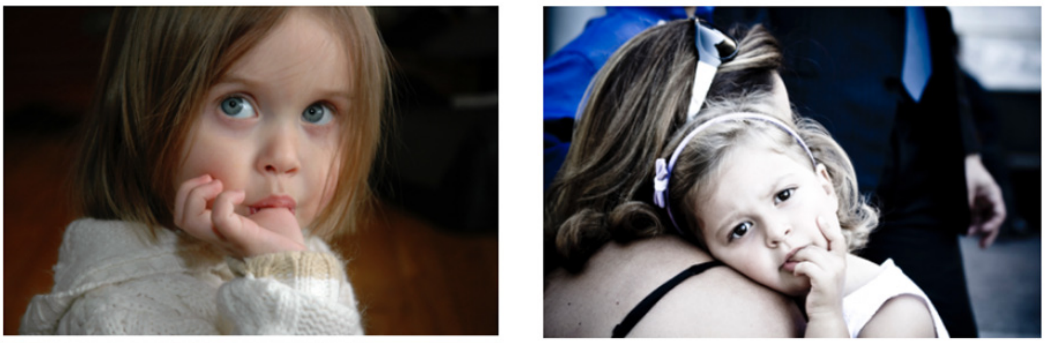
Primary incisor teeth may be spaced far enough apart that they do not require flossing. When adjacent teeth are touching, dental floss may be used to clean interproximal (in between) surfaces of teeth not effectively cleaned by brushing. Gentle pressure should be used during flossing to prevent injury to the gingival tissues as floss is guided between the teeth. Completion of the task by the caregiver is necessary. A flossing aid may provide the caregiver easier access to the posterior teeth.

Early Childhood Caries

Counseling caregivers regarding feeding practices and daily tooth cleaning for infants should include information on Early Childhood Caries (ECC). ECC is a particularly virulent but multifactorial form of caries that can develop when an infant is provided a bottle of formula, milk, or sugary liquids for at-will feedings and/or at sleep times. Sugary liquids remain in the mouth for hours creating an acid environment that enhances enamel demineralization. Caries progression depends on sufficient levels of Streptococcus mutans and Lactobacillus species, and saliva-sharing habits (such as utensil sharing) are discouraged to decrease the transmission of this bacteria.

ECC is defined as the presence of one or more decayed (noncavitated or cavitated lesions), missing (due to caries), or filled tooth surfaces in any primary tooth in a child under the age of six. Severe ECC is any sign of smooth surface caries in a child under the age of 3, any lesion in a maxillary anterior tooth in a child ages 3 through 6, or any DMFT score higher than the child's age for children ages 3 through 6.

Because children who experience ECC have a greater probability of subsequent caries development in both the primary and permanent dentitions, aggressive preventive and therapeutic measures often are necessary. Silver diamine fluoride (SDF), interim therapeutic restoration (ITR), and stainless steel crowns (SSC) should be considered as management options. Without early caries detection and therapeutic intervention, extractions may be later indicated. Sedation or general anesthesia are often necessary adjuncts in guiding the



Nonnutritive Sucking Habits

Changes in Dentition Due to Nonnutritive Sucking Habits

behaviors of young children who require dental treatment.

Nonnutritive Sucking Habits

Habits such as finger or thumb sucking and pacifier use are a normal part of neonatal development. Digit sucking habits are thought to arise from the rooting reflex. Nonnutritive sucking habits are a source of comfort to most infants.

The rooting reflex will start to dissipate at 7 months of age; the sucking reflex will be replaced with other feeding skills by 12 months of age.

Spontaneous abandonment of oral habits usually occurs between 2 and 4 years of age. Changes in the primary dentition can occur when nonnutritive sucking continues, depending on the intensity, frequency, and duration of the habit. If unaddressed, continuing habits can affect the permanent dentition.

In children age 3 years old and older, nonnutritive oral habits are no longer considered normal and may be viewed in some cultures as socially unacceptable. Intervention may be required to decrease or eliminate the habit and minimize potential deleterious effects on the dentofacial complex. Success

Types of Pacifiers and Appropriate Placement

Dental Sealants: Before

Dental Sealants: After

depends on the child's readiness to discontinue the habit.

Pacifiers should never be attached around the child's neck. Use of a sweetener on the pacifier nipple is discouraged. Pacifiers must also be kept clean and replaced when worn. Children should not be allowed to run or play with their pacifiers in their mouths.

The ability to gradually discontinue the use of the pacifier by limiting the time it is available to the child is one method for gradual elimination of a pacifier habit. Nonnutritive sucking of a pacifier is an easier habit to break than nonnutritive digit sucking.

Dental changes created with prolonged pacifier use are similar to those of finger or thumb sucking habits, though protrusion of the anterior incisors may not be as pronounced.

Sealants

Sealants are effective in preventing and arresting pit-and-fissure occlusal carious lesions of primary and permanent molars in children and adolescents when compared with no sealants or the use of fluoride varnish. Sealants also minimize the progression of noncavitated occlusal carious lesions. Sealant placement on those teeth at highest risk will give the greatest benefit. High-risk pits and fissures should be sealed as soon as possible.

Active cavitated caries lesions before application of SDF

SDF-treated lesions with temporary gingival staining

Low-risk pits and fissures may not require sealants. As caries risk may increase due to changes in patient habits, oral microflora, or physical condition, unsealed teeth might subsequently benefit from sealant application.

Dental sealants are available in an opaque, tinted, or clear form. Tinted and opaque sealants are easier to detect at subsequent dental examinations.

Studies incorporating recall and maintenance have reported sealant success levels of 80 % to 90 % after 10 or more years. Sealants are easily repaired or replaced if necessary. Two systematic reviews show 80 and 81% caries reduction due to sealant placement. The CDC and the Community Preventive Services Task Force both endorse school based sealant programs.

Nonsurgical Caries Management

Silver Diamine Fluoride (SDF)

Traditional restorative treatment is sometimes not feasible or possible. This could be due to a patient's young age, temperament or behavior, inability to cooperate for treatment (children with special health care needs, for example), poor access to dental care, or need for advanced pharmacological management (general anesthesia or sedation) for traditional treatment that is not accessible or medically advisable. As part of the caries management plans for these patients, an inexpensive, topical medicament called silver diamine fluoride (SDF) can be applied to carious lesions to slow or arrest caries progression, prevent further loss of tooth structure, reduce tooth sensitivity, and defer dental treatment until patient is older, more cooperative, or medically stable for treatment.

Hall technique Stainless Steel Crown

SDF is a 38% silver diamine fluoride alkaline liquid approved for use in the US in 2014 but has been used for a half century in other countries to arrest caries in primary and permanent teeth. It has antibacterial properties on dentin, reduces formation of biofilm, and forms fluorapatite when reacting with hydroxyapatite to make the tooth surface more resistant and less soluble in an acidic environment. SDF is easily applied with a small brush or special type of floss (if treating interproximal caries, caries between the teeth) and only needs one minute of application time.

An important consideration when discussing SDF as a treatment option, is the fact that it heavily stains treated areas black due to the deposit of silver phosphate over the affected dentin. This staining can be a deterrent for parents and patients to accept treatment with SDF and needs to be thoroughly discussed as part of the informed consent process. Case selection of teeth for treatment with SDF is very important. Teeth to be treated with SDF need to show lack of pulpal involvement and need to be free irreversible pulpitis symptoms such as nocturnal or spontaneous pain. Continued monitoring of the lesions and SDF

re-application by a dental professional as well as dietary changes for the patient are important to the success of the treatment.

Hall Technique Stainless Steel Crowns (SSCs)
Another available nonsurgical and minimally invasive caries management option for the patient population discussed above is the Hall technique SSC. This technique eliminates the need for local anesthesia, caries removal, and tooth preparation as the crown is seated over an unprepared carious tooth. This treatment can be done in one visit if there is adequate spacing between teeth, or may benefit from the placement of elastic spacers to spread the teeth apart prior to crown fitting. The goal of a Hall crown is to seal and isolate the carious lesion from the intraoral biofilm and thus prevent caries progression. This technique is indicated for carious primary molars with no signs or symptoms of pulpal inflammation or involvement. Proper diagnosis for case selection is vital to the success of the treatment and regular follow up is recommended.

Since there is no reduction of the tooth, there is a temporary increase in the occlusal vertical dimension, causing a "high bite" that tends to even out within a few weeks. There have been promising data that show the Hall technique to be very similar in success rates when compared with traditional SSCs.

Orofacial Trauma

Injuries to the Primary and Permanent Dentition

As in any injury, an adequate history is essential for proper diagnosis and treatment. Before initiating any treatment, a systemic and neurological assessment of the child should be completed. The child's general health history should be reviewed. Depending on the nature of the injury, adequate tetanus immunization should be ensured.

Clinical examination should rule out major systemic injury and include facial and neck palpation to determine if any injuries have occurred to bones, joints, or soft tissues.

Intra-oral examination should include the injured tooth or tissues as well as all surrounding soft and hard oral tissues for possible secondary injuries. Radiographs are requested based on clinical findings.

Child Abuse - Non Accidental Injuries

The examiner should always be alert to the potential for child abuse in injury cases and cognizant of the legal responsibility to report any suspicions to the proper authorities. Physical abuse is usually recognized by the pattern of injury and/or its inconsistency with history. Bruises, welts, fractures, burns, and lacerations are commonly inflicted physical injuries. Head, face, and neck injuries occur in more than half of the cases of child abuse. Sexual abuse may be suspected when there is palatal bruising. While the oral cavity is a frequent site of sexual abuse in children, visible oral injuries or infections can be rare.

Unintentional or accidental injuries to the mouth are common and must be distinguished from abuse based on whether the history, including the timing and mechanism of injury, is consistent with the characteristics of the injury and the child's developmental capabilities.

Dentists are mandatory reporters for suspected child abuse and must be advocates for children.

Injuries to Primary Teeth

The greatest incidence of trauma to the primary dentition occurs at 2 to 3 years of age, when motor coordination is developing. The most frequently injured teeth are the maxillary incisors.

Injuries to primary teeth include fracture, displacement, and avulsion.

Small fractures of primary teeth may leave a sharp tooth surface and may require smoothing. If the fracture exposes the pulp, either pulp (or endodontic) treatment and crown or extraction may be required. Tooth fractures must be assessed radiographically to determine if root fractures are present.

Displacement injuries need to be evaluated to determine the child's occlusion and the proximity of the injured primary tooth

to the developing permanent tooth. An extruded primary tooth that interferes with a child's ability to bite (or occlude) should be repositioned or extracted. An intruded tooth not contacting the permanent tooth bud may be allowed to re-erupt. Immediate extraction may be indicated if the radiograph reveals that the intruded tooth contacts the permanent tooth bud. Periodic reevaluation of the intruded tooth is prudent.

Avulsion

Avulsion is complete displacement of the tooth from the socket. Avulsed primary teeth should not be replanted. In the primary dentition, the maxillary anterior region is at low risk for space loss unless the avulsion occurs prior to the eruption of the canines or the dentition is crowded. Fixed or removable appliances, while not always necessary, can be fabricated to satisfy parental concerns for esthetics or to return a loss of oral or phonetic function.

An avulsed permanent tooth should be replanted as soon as possible. Care should be taken to handle the crown rather than the root surface, though foreign material on the root may be rinsed briefly with cold water prior to reimplantation. The reimplanted tooth should be stabilized in its anatomically correct location by a flexible splint for 2 weeks.

If it is not possible to reimplant the tooth right away, it should be stored in a medium that will help maintain the vitality of the periodontal ligament fibers on the root's surface. Transportation media for avulsed teeth include: Hank's Balanced Salt Solution, cold milk, saliva (either by holding the tooth in the mouth between the molars and cheek, or by spitting into a cup and storing the tooth in the cup), or physiologic saline. Teeth should not be stored in water and should never be allowed to dry.

In permanent avulsed teeth, there is considerable risk for pulp necrosis, root resorption, and ankylosis following reimplantation. The risk of ankylosis increases significantly with increased extraoral dry time. An extraoral dry time of greater than 60 minutes is considered the point where survival of the root periodontal cells is unlikely. However, reimplantation may still be considered for the chance to preserve alveolar bone following a later decoronation procedure. Tetanus prophylaxis and antibiotic coverage should be considered if the avulsed tooth was in contact with soil.

Injury to Primary Incisor

Fractured Primary Tooth

Displaced Primary Teeth

Close monitoring is required following reimplantation. If the avulsed tooth had a closed apex, pulpectomy/debridement should be performed within 7 to 10 days. When an avulsed immature tooth is reimplanted, it has a chance of remaining vital due to its open apex and exposed neurovascular bundle. If the tooth becomes necrotic, a revascularization procedure can be performed to stimulate continued root formation and apex closure.

Avulsion Site

Avulsion Tooth

Splinted Avulsed Tooth

6 Month Follow-up

Luxated Permanent Tooth

Intruded Permanent Teeth

Extruded Permanent Teeth

Displaced Permanent Teeth

Trauma can result in the displacement of teeth into the bone (intrusion), partially out of the socket (extrusion), or in another direction (lateral luxation). For intruded permanent teeth with immature root formation, the objective is to allow for spontaneous eruption. Intruded permanent teeth with complete root formation may be repositioned surgically or orthodontically. Permanent teeth that have been extruded or luxated laterally need to be repositioned as soon as possible to optimize healing of the periodontal ligament and neurovascular supply. They should be stabilized by splinting in their anatomically correct position. Mature permanent teeth that have been displaced or loosened may undergo pulpal necrosis due to associated injuries to the blood vessels at the apex and, therefore, must be followed carefully.

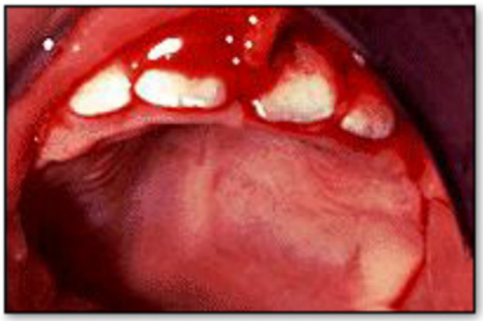
Dental Fractures

Fractured permanent teeth should be evaluated as soon as possible for pulpal exposure. In immature permanent teeth, after minimally removing the affected exposed pulp tissue and controlling hemorrhage by the dentist, the healthy coronal pulp is covered with a material such as calcium hydroxide or mineral trioxide aggregate prior to placing a restoration that seals the tooth from microleakage. This procedure is called a partial

Fractured Permanent Tooth

Laceration of Tongue

Soft Tissue Trauma of the Palate



Frenum Laceration

Lacerated Lip

or Cvek pulpotomy. Periodic evaluation of pulpal condition is required to monitor healing.

Soft Tissue Trauma

Soft tissue trauma may include lacerations to the lips, frenum, tongue, cheeks, and hard and soft palate. Frenum lacerations are common in toddlers who fall when learning to walk and are also associated with forced feeding. Children who ambulate while holding rigid objects in their mouths are at risk for hard and soft palate lacerations if they fall. Lacerated lips may contain tooth fragments if a tooth is also fractured in the injury. A soft tissue x-ray of the area of laceration should be taken and any tooth fragments or other debris should be removed before suturing or allowing for healing.

Wound management consists of hemorrhage control, cleansing, and sutures as indicated. Antibiotics are recommended for "through and through" lacerations.

The risk of severe dental and facial injuries can be reduced significantly when carefully fitted mouthguards and facemasks are worn when participating in sporting activities. Routine use of helmets (e.g. for bicycling and skateboarding), seat belts, and age-appropriate car seats also can help decrease risk of orofacial injuries.

Oral Electrical Injuries

Oral electrical injuries in children are becoming very rare due to ground-fault breakers and better cord longevity but when they occur are usually the result of a toddler sucking or biting into a live electrical cord. The commissure of the mouth will show extensive damage from the electrical current "arcing," resulting in gray-white tissue with elevated red margins. Bleeding does not usually occur at this stage. Minor pain and swelling usually result.

Emergency treatment is based on the extent of the wound. Debridement, systemic antibiotics,

Prevention of Dental Trauma

Scarred Commissure Burn

Commissure Splint

Commissure Splint in Place

and a tetanus booster should be considered. Parents should be cautioned that the eschar will slough in 5-7 days and that significant bleeding could occur at this time.

A commissure splint is fabricated within days of the injury and is worn for up to 12 months following the burn to prevent microstomia secondary to wound contraction. Treatment should be intradisciplinary with engagement of a plastic surgeon to finalize optimal appearance.

Conclusion

As discussed in this course, a child's oral health is an integral part of overall health. Appropriate evaluation, treatment, and preventive measures should be instituted during infancy and continued on a regular basis to maintain optimal health. The topics presented in this course were selected to provide the background necessary to offer advice on a variety of conditions and to encourage early referral to the pediatric dental professional.

Course Test Preview

To receive Continuing Education credit for this course, you must complete the online test. Please go to: *www.dentalcare.com/en-us/professional-education/ce-courses/ce04/start-test*

1. A diastema is NOT considered part of normal dental development _____.

A. after eruption of the permanent canines
B. in six-year-olds with a diastema in excess of 3 mm
C. in eight-year-olds with a diastema in excess of 3 mm
D. during the primary dentition

2. Fungiform papillae _____.

A. are found on the lateral border of the tongue
B. are the most numerous papillae
C. are singular knoblike projections
D. appear as parallel slits

3. The transverse ridges, located at the anterior portion of the hard palate, are known as _____.

A. maxillary arch
B. rugae
C. alveolar bone
D. incisive papillae

4. Aphthous ulcers are _____.

A. a common acquired condition
B. a congenital condition
C. a developmental condition
D. characterized by raised, white, curd like plaques

5. Systemic symptoms of fever, malaise, and cervical lymphadenopathy are associated with _____.

A. primary herpetic gingivostomatitis
B. aphthous ulcers
C. mucocele
D. Hemangioma

6. At what age does mineralization begin for primary teeth?

A. 8 months
B. 7 weeks
C. 4th month of fetal development
D. 13 weeks

7. Early or late loss of primary teeth is sometimes associated with which condition?

A. Glossitis
B. Hypothyroidism
C. Candidiasis
D. Fluorosis

8. Discoloration of teeth will not occur from tetracycline administration _____.

A. between the ages of six-months to four-years
B. between ages of four-years to eight-years
C. with long-term use by any child
D. after crown formation is complete

9. Which of the following is true?

A. Gemination and fusion can be distinguished only by dental x-rays.
B. Fusion is the union of two separate developing teeth.
C. Geminated teeth have two pulp chambers, two canals.
D. Fused teeth have one pulp chamber, two canals.

10. This condition is frequently undetected and causes hypernasal speech:

A. Congenital epulis of the newborn
B. Submucous clefts
C. Mucocele
D. Fusion

11. The caries process is best defined as _____.

A. continuous demineralization with intermittent remineralization
B. fermentable carbohydrates as fuel for bacteria collecting around the tooth surface producing lower pH and initiating the decay process
C. high pH causing the deposit of calcium and other minerals
D. high pH causing calcium, phosphate and other minerals to diffuse out of the enamel

12. Over-the-counter fluoride mouthrinses are _____.

A. not recommended for preschool-aged children
B. recommended for all children
C. recommended only for children with mild to moderate caries
D. designed for weekly use

13. Spontaneous abandonment of oral habits normally occurs at _____.

A. 12 months
B. 1-2 years of age
C. 2-4 years of age
D. 4-6 years of age

14. Caregiver counseling should include _____.

A. no sugary liquids at sleep times
B. daily teeth cleaning
C. no at-will feeding with formula, milk or sugary liquids
D. All of the above.

15. An avulsed permanent tooth should be _____.

A. placed in a dry, low humidity, bag or container
B. scrubbed clean and kept sterile until reimplantation can be assessed
C. immediately placed back in socket or kept in an appropriate storage medium
D. wrapped in a wet towel or cloth

16. Repositioning, splinting, and routine pulpal evaluation should be considered for _____.

A. laterally luxated permanent teeth
B. intruded immature permanent teeth
C. avulsed primary teeth
D. None of the above.

17. In soft tissue trauma antibiotics are recommended for "through and through" lacerations.

A. True
B. False

18. Risk for dental injuries occurring while playing sports _____.

A. cannot be decreased
B. can be decreased with the use of a carefully fitted mouthguard
C. can be decreased without proper training and instruction
D. can be decreased if contact sports are not pursued until the age of 10

19. A commissure splint after an electrical burn is recommended to _____.

A. ensure proper cosmetics during healing
B. prevent excessive scarring
C. be worn for a maximum of six months
D. prevent microstomia secondary to wound contraction

20. One major disadvantage of using Silver Diamine Fluoride (SDF) to arrest caries is _____.

A. Very high cost compared to other restorative materials
B. Dark, persistent staining of treated carious lesion
C. Requires special equipment for application
D. It is time consuming to apply

References

1. Nowak AJ, et al. Pediatric dentistry: Infancy through adolescence. 6th edition. Saunders 2019.
2. Dean JA, Avery DR, McDonald RE, et al. McDonald and Avery's dentistry for the child and adolescent. St. Louis, MO. Elsevier, 2016.
3. Nowak AJ, Casamassimo PS. The Handbook of Pediatric Dentistry. 5th ed. Chicago: American Academy of Pediatric Dentistry, 2018.
4. U.S. Department of Health and Human Services. Oral Health in America. A report of the surgeon general. Rockville, MD: U.S. department of health and human services, national institute of dental and craniofacial research, national institutes of health. 2000.
5. Hale KJ; American Academy of Pediatrics Section on Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. Pediatrics. 2003 May;111(5 Pt 1):1113-6.
6. American Academy of Pediatric Dentistry. Policy on the Dental Home. Accessed January 10, 2022.
7. American Academy of Pediatric Dentistry. Guideline on periodicity of examination, preventive dental services, anticipatory guidance/counseling, and oral treatment for infants, children, and adolescents. Accessed January 10, 2022.
8. Hall RK. Pediatric orofacial medicine and pathology. Chapman & Hall, 1994.
9. Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth. John Wiley & Sons, 2013.
10. American Dental Association Council on Scientific Affairs. Fluoride toothpaste use for young children. J Am Dent Assoc. 2014 Feb;145(2):190-1. doi: 10.14219/jada.2013.47.
11. Society of Teachers of Family Medicine. Smiles for Life: A National Oral Health Curriculum. Accessed January 10, 2022.
12. U.S. Department of Health and Human Services Federal Panel on Community Water Fluoridation. U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries. Public Health Rep. 2015 Jul-Aug;130(4):318-31. doi: 10.1177/003335491513000408.
13. American Academy of Pediatric Dentistry. Policy on Use of Fluoride. Accessed January 10, 2022.
14. American Academy of Pediatric Dentistry. Fluoride Therapy. Accessed January 10, 2022.
15. Community Preventive Services Task Force. Dental Caries (Cavities): School-Based Dental Sealant Delivery Programs-Finding and Rationale Statement. Accessed January 10, 2022.
16. Gooch BF, Griffin SO, Gray SK, et al. Preventing dental caries through school-based sealant programs: updated recommendations and reviews of evidence. J Am Dent Assoc. 2009 Nov;140(11):1356-65.
17. Wright JT, Crall JJ, Fontana M, et al. Evidence-based clinical practice guideline for the use of pit-and-fissure sealants: A report of the American Dental Association and the American Academy of Pediatric Dentistry. J Am Dent Assoc. 2016 Aug;147(8):672-682.e12. doi: 10.1016/j.adaj.2016.06.001.
18. American Academy of Pediatric Dentistry. Policy on Early Childhood Caries (ECC): Classifications, Consequences, and Preventive Strategies. Accessed January 10, 2022.
19. Moursi AM, Fonseca MAda, Truesdale AL. Clinical cases in pediatric dentistry. Chichester, West Sussex, UK. Wiley-Blackwell, 2012.
20. University Hospital Copenhagen. Dental Trauma Guide-evidence based treatment guide. Accessed January 10, 2022.
21. Stephan RM, Miller BF. A quantitative method for evaluating physical and chemical agents which modify production of acids in bacterial plaques on human teeth. J Dent Res. 1943;22(1):45-51. Accessed January 10, 2022.
22. Reamy BV, Derby R, Bunt CW. Common tongue conditions in primary care. Am Fam Physician.

2010 Mar 1;81(5):627-34.
23. The Reference Manual of Pediatric Dentistry. Chicago, Ill: American Academy of Pediatric Dentistry; 2019.
24. American Academy of Pediatric Dentistry. Guideline on Infant Oral Health Care. Accessed September 20, 2021.
25. Kerr R, Claman D, Amini H, Alexy E, Kumar A, Casamassimo PS. Evaluation of the Ability of Five- to 11-Year-Olds to Brush Their Teeth Effectively with Manual and Electric Toothbrushing. Pediatr Dent. 2019 Jan 15;41(1):20-24. PMID: 30803472.
26. American Academy of Pediatric Dentistry. Dental Growth and Development. Accessed January 10, 2022.
27. Bimstein E, Rotstein I. Cvek pulpotomy - revisited. Dent Traumatol. 2016 Dec;32(6):438-442. doi: 10.1111/edt.12297. Epub 2016 Jul 10. PMID: 27397639.
28. Innes NP, Evans DJ, Stirrups DR. The Hall Technique; a randomized controlled clinical trial of a novel method of managing carious primary molars in general dental practice: acceptability of the technique and outcomes at 23 months. BMC Oral Health. 2007 Dec 20;7:18. doi: 10.1186/1472-6831-7-18. PMID: 18096042; PMCID: PMC2265270.
29. BaniHani A, Duggal M, Toumba J, Deery C. Outcomes of the conventional and biological treatment approaches for the management of caries in the primary dentition. Int J Paediatr Dent. 2018 Jan;28(1):12-22. doi: 10.1111/ipd.12314. Epub 2017 Jul 9. PMID: 2869
30. Zhao IS, Gao SS, Hiraishi N, Burrow MF, Duangthip D, Mei ML, Lo EC, Chu CH. Mechanisms of silver diamine fluoride on arresting caries: a literature review. Int Dent J. 2018 Apr;68(2):67-76. doi: 10.1111/idj.12320. Epub 2017 May 21. PMID: 28542863.
31. American Academy of Pediatric Dentistry. Resources: SDF Chairside Guide. Accessed January 10, 2022.

Additional Resources

- Fisher-Owens SA, Gansky SA, Platt LJ, et al. Influences on children's oral health: a conceptual model. Pediatrics. 2007 Sep;120(3):e510-20. doi: 10.1542/peds.2006-3084.
- Ayaz J. Tooth Decay and Nutrition. Dr. Jafri's Blog. 2015. Accessed January 10, 2022.
- Heasman PA, Waterhouse PJ. Chronic marginal gingivitis in a 10-year-old girl. Photo. Pocket Dentistry. Accessed January 10, 2022.

About the Author

American Academy of Pediatric Dentistry

The American Academy of Pediatric Dentistry is the recognized authority on children's oral health. As advocates for children's oral health, the AAPD promotes evidence-based policies and clinical guidelines; educates and informs policymakers, parents and guardians, and other health care professionals; fosters research; and provides continuing professional education for pediatric dentists and general dentists who treat children. Founded in 1947, the AAPD is a not-for-profit professional membership association representing the specialty of pediatric dentistry. Its 10,000 members provide primary care and comprehensive dental specialty treatments for infants, children, adolescents and individuals with special health care needs.

Vision
Optimal oral health for all children.

Mission
To advance optimal oral health for all children by delivering outstanding service that meets and exceeds the needs and expectations of our members, partners and stakeholders.

AAPD Culture
Our members put children first in everything they do, and at the highest standards of ethics and patient safety. As such, the American Academy of Pediatric Dentistry is THE leading national advocate dedicated exclusively to children's oral health. We are the embodiment of our members' expertise as the big authorities on little teeth.

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