

## Clinical Encounters in Pediatric Dentistry

*This course is no longer offered for Continuing Education credit.*

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**Intended Audience:** Dentists, Dental Hygienists, Dental Assistants, Dental Students, Dental Hygiene Students, Dental Assistant Students

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**Disclaimer:** Participants must always be aware of the hazards of using limited knowledge in integrating new techniques or procedures into their practice. Only sound evidence-based dentistry should be used in patient therapy.

### Introduction

This course will discuss a variety of dento/oro/facial conditions commonly found in pediatric patients and their management from infancy to adolescence.

### Conflict of Interest Disclosure Statement

- Dr. Schwartz was a member of the dentalcare.com Advisory Board.

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## Overview

The pediatric dental patient presents to the dentist a variety of clinical encounters not seen in adults. Recognition and management of these conditions may require that the dentist provide actual treatment to the patient or just reassurance to the parent. This course will discuss a variety of dento/orofacial conditions commonly found in pediatric patients and their management from infancy to adolescence. The topics covered in this course are:

- Soft tissue pathology
- Hard tissue pathology
- Dental developmental problems
- Teething
- Nursing caries
- Habits
- Eruption problems
- Space maintenance

## Learning Objectives

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

- Cysts, viral, ulcerative, fungal and bacterial lesions.
- Enamel stains and defects.
- Geminated, fused and supernumerary teeth.
- Teething problems.
- The etiology and treatment of early childhood caries.
- Consequences and elimination of oral habits.
- Neonatal, over-retained teeth, ectopic eruption, missing teeth.
- Consequences of early tooth loss and space maintenance.

## Introduction

The pediatric dental patient presents to the dentist a variety of clinical encounters not seen in adults. Recognition and management of these conditions may require that the dentist provide actual treatment to the patient or just reassurance to the parent. This course will discuss a variety of dento/orofacial conditions commonly found in pediatric patients and their management from infancy to adolescence.

## Soft Tissue Pathology

### Epstein Pearls

Epstein pearls are small white lesions that form along the midpalatine raphe. They are thought to be remnants of epithelial tissue that were trapped along the raphe as the fetus grew. No treatment is necessary as the lesions spontaneously shed within weeks of birth.

### Bohn's Nodules

Bohn nodules are formed along the buccal and lingual aspects of the dental ridge and on the palate away from the raphe. The nodules are considered remnants of mucous gland tissue. No treatment is necessary as the nodules spontaneously disappear within weeks of birth.



Epstein Pearls



Bohn's Nodules

## Dental Lamina Cysts

Dental lamina cysts are found on the maxillary and mandibular dental ridges. It is thought the cysts originate from remnants of the dental lamina. No treatment is necessary as the cysts disappear within weeks of birth.

## Riga-Fede Aphthae/Granuloma

Riga-Fede aphthae are granulomatous ulcerations that appear on the tip and inferior surface of the tongue. They are due to chronic trauma to the tongue from the primary incisors during sucking or involuntary movement of the jaw. Treatment consists of reducing the sharpness of the teeth by placing a protective composite shield over the incisors or extraction of the teeth.

## Eruption Cysts

Eruption cysts are associated with erupting deciduous or permanent teeth. The lesions present as soft well demarcated swellings overlying the crown of the erupting teeth. Variations in color may exist depending on the amount of blood contained within the cyst. Treatment for the cysts is often not necessary because they rupture as the teeth erupt. However it is suggested that the clinician inform the parent of the possibility of the appearance of blood on the pillow following sleep.

## Geographic Tongue

Geographic tongue is a harmless common disorder of the tongue characterized by atrophy or temporary loss of filiform papillae. The lesions are usually multiple and asymptomatic, although burning can occur. The lesions can last for two weeks, disappear and reappear in another area. No treatment is indicated.

## Postoperative Soft Tissue Injury

Accidental biting or chewing of the lip, tongue or cheek is a problem seen in very young pediatric patients and mentally or physically disabled patients. Soft tissue anesthesia lasts longer than pulpal anesthesia and may be present for up to 4 hours after local anesthesia administration. The most common area of trauma is the lower lip and to a lesser extent the tongue, followed by the upper lip. The management of soft tissue trauma involves reassuring the patient and



Dental Lamina Cysts

Stages of Change	Characteristics of Stages of Change
Stage 1 Precontemplation	The individual is not willing to change oral health habits in the next 6 months and may not even recognize there is a problem.
Stage 2 Contemplation	The individual is considering change and undergoing a process of evaluating the pros and cons of the problem behavior and the changes that need to take place. This person is open to collaboration with healthcare providers and is ready to change current behavior within 6 months.
Stage 3 Preparation	The individual is ready to make a commitment to change oral health habits in the next 30 days and to set a target date.
Stage 4 Action	Change or modification of behavior actually takes place.
Stage 5 Maintenance	This individual has had 3 to 6 months of successful behavior change and is focusing on lifestyle modifications in order to avoid relapse and sustain behavior change.

## Riga-Fede Aphthae/Granuloma



Eruption Cysts

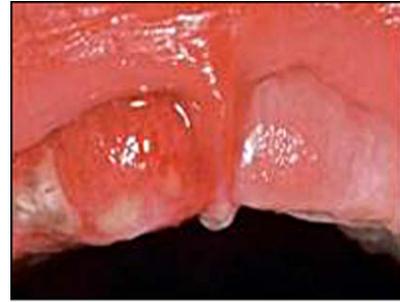


Eruption Cysts

parent that it's normal if the tissue turns white, allowing up to a week for the injury to heal, and lubricating the area with petroleum jelly or antibiotic ointment to prevent drying, cracking and pain.



Geographic Tongue



Primary Herpetic Gingivostomatitis



Postoperative Soft Tissue Injury



Primary Herpetic Gingivostomatitis

## Viral and Ulcerative Lesions

### Primary Herpetic Gingivostomatitis

Primary herpetic gingivostomatitis is the most frequent acute viral infection of the oral mucosa. Its etiology is the herpes simplex virus type 1 and rarely type 2. Lesions are acquired through direct contact; parent or sibling kissing, sharing of toys.

Vesicles appear on the gingiva, tongue, palate, lips, buccal mucosa, tonsils and posterior pharynx. Perioral lesions may occur occasionally. Vesicles progress to ulcers. The appearance of lesions is accompanied by fever, malaise, and cervical lymphadenopathy.

Occurrence is between 6 months to 6 years but can occur later. The acute phase lasts 7-10 days with spontaneous healing in 1-2 weeks. After healing the virus remains latent in the body.

For patients that can rinse, treatment consists of rinsing with a suspension of diphenhydramine (Benadryl®), Kaopectate and Viscous Lidocaine for topical relief of oral lesions and rest,<sup>1</sup> antipyretics, analgesics for systemic symptoms. The clinician should advise the parent of the importance of hydration. Acidic foods (tomato

sauce) and fluids (juice) should be avoided. Cold items such as ice cream, popsicles and ice chips can soothe affected tissues. Analgesics, topicals and coating agents may help relieve discomfort. Systemic antivirals may be considered for immunocompromised patients. To prevent further spread of infection direct contact with others should be avoided such as not sharing items such as toys, food, utensils, pacifiers, cups, bottles, toothbrushes and towels.

### Recurrent Herpetic Gingivostomatitis

Recurrent herpetic gingivostomatitis is the result of herpes simplex virus reactivation in previously infected individuals. The factors that may precipitate virus activation are: illness, trauma, stress, ultraviolet light and HIV.

It is found on the lips, hard palate and attached gingiva. The symptoms are milder than the primary infection. The oral lesions are a small number of vesicles in clusters that rupture within 24 hours leaving ulcers 1-3mm in size that heal within 6 to 10 days. Lip lesions are covered with a brown crust. Treatment is symptomatic, however systemic acyclovir (200mg every 3 hours while awake for 5 days) may be indicated for children with six or more episodes per year.

### **Aphthous Ulcer/Stomatitis**

Aphthous ulcers are painful oral ulcers that tend to recur. The exact etiology is unknown however predisposing factors are trauma, genetics, stress, allergies, hormonal disturbances and AIDS. They tend to appear during the first and second decades predominately in girls.

The severity ranges from minor to major. They are seen on mobile tissues as an ulcer covered by a white membrane surrounded by a red halo. While often mistaken for herpetic gingivostomatitis in appearance, the patient does not develop fever. The ulcers last 6-12 days.

Treatment is palliative; bland diet and application of Orabase® with benzocaine or fluocinonide (Lidex® gel)

### **Angular Cheilitis**

Angular Cheilitis is a common disorder that occurs at the corners of the lips. It tends to appear in the first and second decade with no gender predilection. Its etiology is multifactorial; mechanical irritation, candidiasis, bacterial infection, habitual licking of corners of lips, deficiency anemia, and AIDS. Treatment consists of topical application of antifungal and antibacterial ointment.

### **Candidiasis**

Candidiasis is a fungal infection characterized by raised curdlike plaques that leave raw bleeding surfaces when scraped. It occurs in children who are on long-term antibiotic therapy or are immunosuppressed. It is treated with topical or systemic antifungal agents (Nystatin, clotrimazole).

### **Bacterial Infections**

#### **Cellulitis**

Cellulitis is an acute and edematous inflammatory infection that spreads into the facial tissues. Its etiology is Staphylococcus aureus,  $\alpha$ -hemolytic streptococci, Haemophilus influenza type B and less often Gram-negative and anaerobic microorganisms. The source of infection is usually odontogenic but it can be sinus, skin or glandular in origin. Systemic



Recurrent Herpetic Gingivostomatitis



Aphthous Ulcer/Stomatitis



Angular Cheilitis



Candidiasis

complications include sepsis and dehydration. Maxillary cellulitis can lead to CNS involvement (meningitis, brain abscess) and cavernous sinus thrombosis. Mandibular cellulitis can lead to the spread of swelling to the submandibular, sublingual, submental spaces (Ludwig angina),



Cellulitis



Alveolar Abscess



Cellulitis



Alveolar Abscess

fascial planes, nerves and blood vessels resulting in airway obstruction and restricted swallowing.

If the child is febrile, dehydrated, exhibits chills or if there is suborbital or submandibular swelling he/she should be admitted to the hospital for observation, IV hydration and antibiotics. The offending tooth should be extracted when the patient can tolerate the procedure.

I

### Alveolar Abscess

An alveolar abscess is an accumulation of purulent material around the apex of a nonvital tooth as a result of pulpal necrosis. Clinical symptoms include a thickened periodontal membrane leading to sensitivity to percussion and movement, and swelling of the surrounding tissues. The patient may exhibit mild fever.

Antibiotics relieve acute symptoms. Drainage of the infection via pulpectomy or extraction provides additional pain relief. A regimen of antibiotics may be needed preoperatively to establish effective pain control. If left untreated the pus follows the path of least resistance forming an intraoral or extraoral abscess or sinus tract. Once the infection reaches this

stage treatment can be initiated without prescribing antibiotics.

## Hard Tissue Pathology

### Stains

Tooth stains are the result of various pigments deposited within the inner layers of the enamel, dentin and pulp (intrinsic stains) or on the outer enamel surface (extrinsic stains). They may be due to systemic factors and involve all the teeth or local factors that involve selected teeth (trauma).

### Intrinsic Stains

A single discolored tooth is usually a result of previous trauma to the tooth. Internal bleeding from pulpal hyperemia stains the inner layer of the dentin. The discoloration appears 3 to 4 weeks after the accident. In patients under three years the tooth may lighten spontaneously after two months. No treatment is required unless pain, mobility, infection is present or if the patient or parent has aesthetic concerns. Lightening of the tooth is accomplished through endodontic treatment followed by internal bleaching (permanent teeth only) and composite. If radiographic examination of a discolored primary



Intrinsic Stains



Cystic fibrosis



Intrinsic Stains



Dentinogenesis imperfecta



Erythroblastosis fetalis



Fluorosis

tooth reveals root resorption, endodontic therapy is contraindicated and extraction is recommended.

Besides trauma intrinsic stains can be a result of systemic conditions. Usually multiple teeth are involved. The following more common conditions cause intrinsic staining:

#### **Erythroblastosis fetalis**

Bilirubin is incorporated into the developing dentition resulting in a yellow-green and blue-green discoloration of the teeth.

#### **Cystic fibrosis**

The disease alone or medication (tetracycline) results in dark teeth ranging from yellowish-gray to dark brown discoloration.

#### **Dentinogenesis imperfecta**

A genetic abnormality of dentin collagen during the histo-differentiation phase results in brownish, semitransparent opalescent teeth.

#### **Fluorosis**

Is due to the defective mineralization of the enamel organic matrix from high levels of ingested fluoride resulting in chalky and opaque white or gray stain and patches. Fluoride is an effective caries preventive agent with no deleterious effects at proper daily dosage. Excess fluoride intake leads to fluorosis, thus fluoride intake for children and especially infants must be monitored. Excess fluoride intake leads to fluorosis, thus fluoride intake for children and especially infants must be monitored. The preventive effects of

fluoride are predominately topical. Fluoride that is swallowed, such as fluoridated water and dietary supplements, have a topical effect on erupted teeth before swallowed, as well as a topical effect due to increased salivary and gingival crevicular levels. Similarly, topical fluoride that is swallowed may have a systemic effect. Parents should control the amount of fluoride ingested by children by following these guidelines:

- Supervise tooth brushing of children under three.
- Use only a smear of fluoridated toothpaste on children less than three years of age and a pea size on children aged three to six years,
- Encourage the child to spit out excess toothpaste.
- Do not let the child eat toothpaste.

For those children that are fed formula the intake of fluoride by infants is influenced more by the water used to reconstitute formulas than by the formulas themselves. Fluoride concentrations in ready-to-feed formulas are relatively low and do not contribute significantly to development of fluorosis. Powdered and liquid concentrates reconstituted with water with 0.7 to 1.2 ppm fluoride contribute to moderate fluorosis. Therefore in areas with these fluoride concentrations, infants may be ingesting fluoride in amounts that may cause fluorosis. To illustrate:

- One cup (8 ounces) of 1ppm fluoridated water = approximately 0.25mg of fluoride.
- Most babies drink 28-32 ounces of formula per day (4 bottles).

- 4 bottles X 0.25mg fluoride = 1 mg fluoride/day.
- The CDC, ADA and AAPD guidelines for ages 0-3 years is to receive 0.25mg fluoride.

Thus the infant receives four times the recommended dose of fluoride. Parents should be counseled to mix 1 bottle of fluoridated water with powdered formula per day. For the remaining bottles use non-fluoridated water.

Treatment of intrinsic stains consists of vital and non-vital bleaching techniques and aesthetic restorations. Microabrasion may be considered for treatment of fluorosis.

### Extrinsic Stains

Extrinsic stains may involve all or some of the teeth and result from an excess of various chemicals or minerals in the saliva. Stain location is around the mandibular incisors in the vicinity of the sublingual glands and the maxillary molars in the vicinity of the parotid glands.

- Iron, magnesium, silver – black pigmentation
- Mercury – gray or green pigmentation
- Lead – gray pigmentation
- Copper – brown or green pigmentation
- Bromides – brown pigmentation
- Nickel – green pigmentation
- Cadmium – yellow pigmentation
- Potassium – violet pigmentation
- Chromogenic bacteria – green and orange stain accumulating on the gingival third of the labial surfaces of teeth usually due to poor oral hygiene. Chromogenic stain is

**Table 1. Dietary Fluoride Supplementation Schedule.**

Age	<0.3 ppm	0.3-0.6 ppm	>0.6 ppm
Birth - 6 months	None	None	None
6 mos - 3 years	0.25 mg/day	None	None
3 - 6 years	0.50 mg/day	0.25 mg/day	None
6 - 16 years	1.0 mg/day	0.50 mg/day	None



Extrinsic Stains



Enamel Defects



Extrinsic Stains



Enamel Defects

easier to remove than chemical or mineral stain.

Removal of the stains ranges from simple rubber cup prophylaxis to aggressive ultrasonic scaling to composite polishing stones.

### Enamel Defects

Enamel defects are due etiological factors occurring during the apposition and mineralization stages of dental development. Enamel defects include a group of clinical factors recognized as enamel hypoplasia, hypocalcification and hypomaturation. The etiology of enamel defects may be attributed to local, systemic and genetic factors.

In defects of local etiology a single tooth is involved such as a traumatic intrusion of a primary tooth into a permanent tooth.

**Defects of systemic etiology** involve multiple teeth developing during the time of action of the etiological factor (medications, fever, malnutrition, illnesses, etc.). Etiological factors occurring during pregnancy affect the primary teeth. Etiological factors occurring after birth will affect the permanent teeth.

**Defects of genetic etiology** usually affect all the primary and permanent teeth.

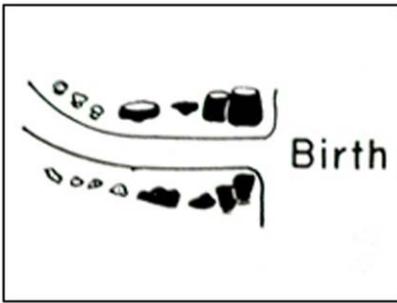
## Developmental Properties

### Gemination

Gemination (twinning) is the incomplete division of the tooth bud resulting in the formation of two partially or completely independent crowns. The pulp chambers and root may be combined or separate. Geminated teeth give the appearance of an extra tooth and result in potential crowding. The area of defect may vary from a minor notch in the incisal edge of the crown to two separate crowns. The area of the defect may be a focal point for caries formation and should be treated with sealants and composites.

### Fusion

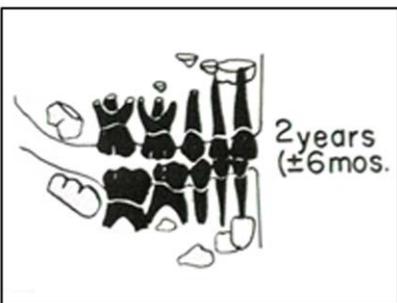
Fusion is the union of two discrete tooth buds to form a tooth with an anomalous shape. It is seen in the anterior region. Fusion of two teeth leads to a reduced number of teeth. Local factors during tooth bud development result in interdental lamina persistence. Genetic factors have also been implicated.



Birth



Defects of systemic etiology



2 years  
(±6 mos.)



Defects of systemic etiology



Defects of genetic etiology



Germination



Germination



Fusion

If fusion occurs early in development the defect affects the total length of the tooth resulting in a single normal size tooth. If fusion occurs later in development the defect only affects the root resulting in shared dentin and cementum and one large tooth with a bifid crown. Fusion only along the line of cementum is referred to as concrescence.

The simplest way to distinguish between gemination and fusion is to count teeth. Gemination results in an extra tooth. Fusion results in a reduced number of teeth.

### Supernumerary Teeth

The term "supernumerary teeth" refers to the presence of extra teeth in the dental arch. It is due to abnormal activity of the dental lamina

leading to the formation of extra tooth buds. There is a greater frequency of occurrence in the maxillary arch (9:1) and in males (2:1). Seventy-five percent remain in bone and are only diagnosed radiographically. They are found in the midline (mesiodens), beyond the 3rd molar (distomolar) or in the molar area (paramolar). Treatment is extraction and orthodontics.

### Dens Evaginatus (Talon Cusp)

Dens evaginatus is an elevated conical defect seen on the lingual or occlusal surface of the affected tooth. It is a genetic defect and rarely seen in primary teeth. Evaginations consist of enamel, dentin and pulp. There is an increased risk of pulp exposure due to trauma by the mandibular incisors occluding into the evagination. There is an increased risk of caries in the area between the lingual surface of the crown and the evagination.

Treatment consists of gradual reduction of the evagination to induce formation of secondary dentin. The technique involves carefully removing enamel without local anesthesia until the patient complains of sensation. Fluoride varnish is applied and the patient returns in 3 months for further reduction. Preventive

application of sealant or flowable composite in non-hygienic areas is recommended.

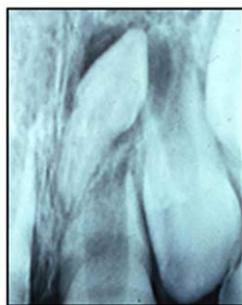
### Dens Invaginatus (Dens in Dente)

Dens invaginatus is a defect characterized by a prominent lingual cusp and centrally located fossa. The defect results from early invagination of enamel epithelium into the dental papilla of the underlying tooth germ. Its occurrence is more common in permanent teeth. There is increased risk of caries forming in the lingual pit of the tooth that can result in pulp infection and necrosis. Treatment involves preventive filling of the pit and endodontic treatment if indicated.

### Microdontia

Microdontia refers to a clinical condition where a tooth appears smaller in size in comparison to other teeth in a normal size jaw. It is rare in primary teeth. It is more common in permanent teeth and in females. The most common locations are the maxillary lateral incisors and third molars. The shape of the tooth may be conical (peg) or normal.

General microdontia may be associated with congenital hypopituitarism, and radiation or chemotherapy exposure. Localized microdontia



Supernumerary Teeth



Dens Evaginatus (Talon Cusp)



Dens Invaginatus (Dens in Dente)



Microdontia



is frequently associated with hypodontia (missing teeth) and it is not unusual to see a microdontic maxillary lateral incisor and a missing contralateral tooth. These defects may be controlled by different mutations of the same gene. The tooth is treated aesthetically with composites, crowns, and orthodontics for closure of spaces.

## Early Childhood Issues

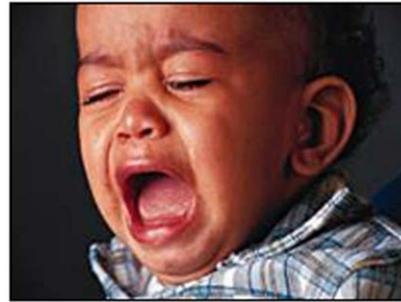
### Teething

Teething is a natural process that usually occurs at about 6 months of age. However, some infants exhibit signs of systemic distress such as crying, increased drooling, high fever, diarrhea, facial rash, sleep difficulty and mild pain. There is a tendency for the child to bite, chew and place their fingers in the mouth. One theory as to the etiology of the symptoms is the timing coincides with the loss of maternal antibodies and the symptoms are reflective of a systemic infection. Treatment is palliative; increased fluid consumption, non-aspirin analgesics, teething rings to apply cold and pressure to the gums. Topical analgesics containing benzocaine should be avoided because of the possibility of methemoglobinemia developing especially in children under 2 years of age. Children with high fevers should be evaluated by their pediatricians.

### Early Childhood Caries (ECC) - Nursing Caries, Baby Bottle Caries

Early childhood caries is due to consumption of fermentable carbohydrate liquids (juices, sodas, infant formula, cow and mothers milk) during excessive bottle feedings and/or prolonged breast feedings. It affects 1-12% of the pediatric population in developed countries and up to 70% in underdeveloped countries.

**Effects of ECC** are demonstrated by initial caries involvement of the maxillary anterior teeth, the maxillary and mandibular first primary molars, and the mandibular canines. Depending on severity the mandibular incisors are unaffected. As early as twelve months, demineralized enamel takes on a chalky white appearance. As caries progresses into dentin, brown lesions form gingivally. Untreated lesions progress into the pulp and eventually abscess.



Teething



Early Childhood Caries (ECC) - Nursing Caries, Baby Bottle Caries



Effects of ECC



Effects of ECC

The **distinctive pattern of ECC** is due to an interaction of factors.

- The child ingests liquids containing fermentable carbohydrates at sleep time.
- The liquid pools around the maxillary incisors, maxillary and mandibular molars



Distinctive pattern of ECC



Thumb and Finger Habits



Treatment of ECC



Thumb and Finger Habits



Treatment of ECC

and mandibular cuspids due to a reduction in salivary flow and swallow reflex. The anterior position of the tongue under the nipple of the bottle or breast protects the mandibular incisors.

#### Treatment of ECC includes:

- Ideally the child is weaned off the bottle by twelve months and is encouraged to drink from a cup. The American Academy of Pediatric Dentistry recommends weaning by 12 months. The American Academy of Pediatrics recommends weaning by 18 months and introduction of a cup at 12 months.
- If that is not possible, water should be substituted for the fermentable liquid. The

author's technique is to recommend to the parents to dilute the fermentable liquid with water by 25%. This level was maintained for two nights. The fermentable liquid was diluted by another 25% for two more nights. Subsequent dilutions were continued until the bottle contained 100% water.

- Treat white spot lesions with fluoride varnish.
- Restore or extract the carious teeth

Early extraction of the maxillary incisors (prior to speech development) may lead to speech problems. It can also cause a self image problem in the child (and to an extent, the parent). Replacement of extracted teeth with a prosthesis may be recommended for proper speech development and aesthetics and if the child is able to tolerate the appliance.

## Oral Habits

### Thumb and Finger Habits

Thumb and finger habits make up the majority of oral habits. However two thirds of children who engage in thumb and finger habits outgrow them by age five. The dentofacial changes will vary with the intensity, duration and frequency of the habit and the position of the digit in the



mouth. The dentofacial changes include:

- Anterior open bite
- Facial movement of the maxillary incisors
- Lingual movement of the mandibular incisors
- Maxillary constriction

The earlier the habit is discontinued the greater the likelihood of dentofacial changes self correcting. However, the child should be allowed to stop the habit spontaneously. Most habits stop in school due to peer pressure so definitive treatment is not initiated until ages 4-6 years. If the child or the parent does not want to discontinue the habit do not force the issue. The type of treatment prescribed is dependent on the child's willingness of the child to stop the habit.

The simplest treatment is counseling the patient. The success of this approach is dependant on the child's ability to understand the consequences of continuing the habit. This approach is most successful in older children. A second approach is reminder therapy. This is effective in a child who wants to stop the habit but needs additional help. The technique involves placing a cue on the patient's finger as a reminder not to place their finger in the mouth, especially while sleeping. The cues may be a bandage, a sock or mitten, a bitter substance or a commercially bought appliance. It is important to emphasize to the child that the treatment mechanism is not a punishment but just a reminder.

The reminder therapy can be used in conjunction with a reward system. A contract is drawn up with the child and parent. The contract states that the child will discontinue the habit in a specified amount of time and if successful will receive a reward (the type agreed upon by the parent and child). Placing stickers

or marks on a calendar monitors the child's progress.

If the habit persists after the reminder therapy and the child truly wants to discontinue the habit then intraoral appliance therapy should be considered. The intention of placement of intraoral appliance is to discourage the habit by making it difficult to suck the thumb or finger.

### Common Intraoral Appliances

The Quadhelix appliance has a dual function. The appliance acts as reminder to the child not to place the thumb or finger in the mouth and simultaneously expands the constricted arch, if present.

The Kentucky Bluegrass appliance discourages the digital habit by reducing sucking satisfaction. The acrylic cylinder spins as pressure is exerted by the thumb or finger interfering with placement of the digit. It does not expand constricted arches.

Image: Kentucky Bluegrass appliance  
The Palatal Crib mechanically interferes with thumb and finger placement. It does not expand a constricted arch.

It should be emphasized to the child that these appliances are not punishments but are aids in discouraging the unwanted habit.

### Pacifiers

The consequences of extensive use of a pacifier are similar to that of finger and thumb sucking but not as pronounced. The pacifier habit tends to end earlier than digital habits because they are easier to lose intentionally or non-intentionally. 90% are ended before 5 years of age and 100% by age 8. The earlier the pacifier is removed the greater the chance of the dentofacial changes self correcting.



Quadhelix appliance



Kentucky Bluegrass appliance



Palatal Crib



Pacifiers



Pacifiers



Lip Habits



Lip Habits

### Lip Habits

Lip licking is the most common lip habit. The most common clinical effects are inflamed chap lips exhibiting an erythematous wide border encircling the lips with normal skin area just around the vermillion border. Severe lip licking, with the lower lip tucked behind the maxillary incisors, places excessive lingually directed forces on the mandibular teeth and facial forces on the maxillary teeth, resulting in retro-inclination of the mandibular incisors, proclination of the maxillary incisors and increased overjet. There is little that can be

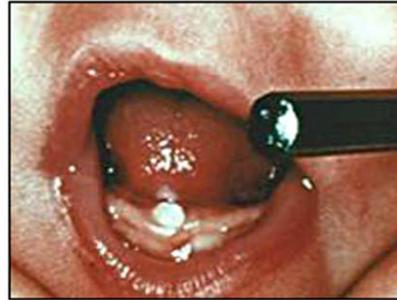
done to stop the habit, however, the irritated areas can be controlled with the application of steroids, antibacterial and antifungal ointments.

### Bruxism

Bruxism is the nonfunctional grinding or gnashing of teeth. It occurs most often during sleep, however some children grind their teeth when awake. It results in wear of teeth



Bruxism



Neonatal Teeth



Bruxism



Over-retained Teeth

and can cause masticatory muscle soreness and TMJ pain. Local factors include occlusal interferences or high restorations. Systemic factors include stress, personality disorders, nutritional deficiencies, allergies, endocrine disorders, musculoskeletal disorders and mental retardation. Most children outgrow the habit and treatment is unnecessary. For those that do not, treatment consists of:

- Equilibration of the occlusal interferences
- Referral to medical personnel to rule out systemic or psychological problems
- Fabrication of a night grinding appliance



Over-retained Teeth

## Eruption Problems

### Natal/Neonatal Teeth

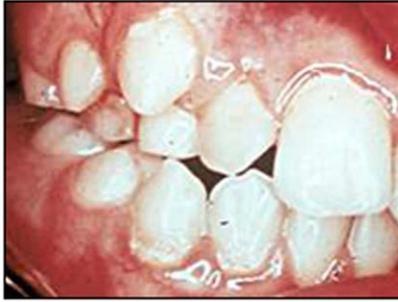
Natal teeth refer to teeth present at birth. Neonatal teeth refer to teeth erupting within one month of birth. The teeth tend to have abnormal roots. Treatment is dependant on the mobility of the teeth and feeding problems. If the teeth are mobile with the strong possibility of aspiration, they should be extracted. If the mother finds breast-feeding painful because of irritation by the tooth on the breast, a composite material can be placed on the incisal surface of the tooth to reduce the sharpness of the tooth. More radical measures would include bottle-feeding the child or extraction.



Over-retained Teeth

### Over-retained Teeth

Over-retention of primary teeth is due to delayed resorption of the roots due to lingual positioning of the permanent teeth due to crowding of the permanent teeth, root canal obliteration (trauma) failure of endodontic obturation material to resorb, and bruxism.



Over-retained Teeth



Diastemas



Orthodontic Problems

The timing of treatment is dependent on which arch is involved.

In the mandibular arch, if the primary tooth is mobile allow the tooth to exfoliate on its own. However if the tooth is not exfoliated by age 8 or three quarters of the root of the permanent tooth is formed, the primary tooth should be extracted. Once the primary tooth is no longer present the permanent will migrate labially spontaneously.

In the maxillary arch, even if the primary teeth are mobile they should be extracted to prevent the permanent tooth from erupting in cross-bite with the mandibular incisor. If the permanent tooth erupts in cross-bite, orthodontic intervention will be necessary to move the tooth into its proper position, as

interference by the mandibular incisor will prevent spontaneous labial migration.  
Image: Over-retained Teeth - maxillary arch  
If the permanent tooth is erupting labially, extraction of the primary tooth is not urgent.  
Image: Permanent tooth erupting labially.

### Diastemas

A diastema is defined as spacing between the maxillary central incisors. It is common and desirable in the primary and mixed dentition. The lack of a diastema in the primary and mixed dentition is indicative of potential crowding in the permanent dentition. The etiology of a large diastema (>2mm) is a deep bite, a tooth size discrepancy (length/width), a large frenum, and presence of a supernumerary tooth. Treatment may involve a combination of orthodontic treatment, veneers or crowns, and surgical removal of the enlarged frenum after completion of orthodontic treatment.

### Orthodontic Problems

An in depth discussion of orthodontic problems is beyond the scope of this course. However the practitioner should be aware that interceptive orthodontic treatment is initiated during the primary and mixed dentition. Waiting to refer the patient for orthodontic treatment until the permanent dentition is fully erupted is an invitation for extensive treatment that might have been avoided with an earlier referral. The practitioner should follow adage "When in doubt, send it out."

### Ectopic Eruption

Ectopic eruption is a malposition of a permanent tooth bud resulting in the tooth erupting in the wrong place. The most common areas are the maxillary first molars, followed by the maxillary cuspids.

**First permanent molar** – Ectopic eruption is due to mesial positioning or inclination of the tooth into the second primary molar. This can result in delay of eruption of the first permanent molar and resorption of the distal root of the second primary molar. Treatment consists of:

- Placement of separating elastics, brass ligature wire or orthodontic appliance to distalize the first molar.

- Contour the distal of the second primary molar.
- Extraction of the second primary molar and placement of a distalizing appliance.

**Cuspid** – Ectopic eruption is due to the mesial inclination of the permanent cuspid becoming impacted in the palate or impacting on the root of the lateral incisor. A clinical indicator is distal tipping of the lateral incisor crown. Panoramic, periapical and occlusal radiographs are used to determine the position of the cuspid relative to the lateral incisor. Treatment consists of:

- Extraction of the primary cuspid.
- Orthodontic lassoing of the permanent cuspid.



Ectopic Eruption - First Permanent Molar



Ectopic Eruption - First Permanent Molar Treatment



Ectopic Eruption - Cuspid Treatment



## Ankylosis

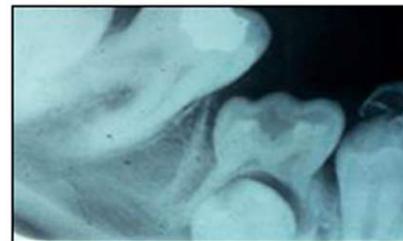
Ankylosis is an interruption of tooth eruption due to the formation a solid union between the root and bone. It is mostly seen in mandibular molars and in traumatized anterior teeth (For an in depth description the reader is referred to the CE course "[Management of Traumatic Injuries in Children's Teeth](http://www.dentalcare.com)" at [www.dentalcare.com](http://www.dentalcare.com)). Submersion is due to alveolar growth surrounding the tooth. In the posterior region the submersion of the ankylosed tooth may cause mesial tipping of the permanent first molar. Treatment:

### Primary molars

- Observe as the tooth may eventually exfoliate
- If the ankylosed primary tooth is interfering with the eruption of the bicuspid extract the primary tooth and place a space maintainer.
- If a permanent tooth is not present build up the primary tooth with composite or a stainless steel crown.

### Unequal Resorption

Unequal resorption of the roots of the primary molars results in over-retention of the teeth. If untreated there may displacement of the permanent tooth. Treatment consists of extraction of the primary tooth. As the



Ankylosis

permanent teeth may be close to eruption space maintenance may not be required.

### **Congenitally Missing Teeth (anodontia, hypodontia)**

Anodontia, the complete failure of teeth to develop, is extremely rare. Hypodontia (partial anodontia) is more common. The most frequently absent teeth in children are mandibular second premolars, maxillary lateral incisors and maxillary second premolars. The congenitally missing teeth may be bilateral or unilateral. If a primary tooth is missing the permanent tooth will usually be missing. However, even if a primary tooth is present a permanent tooth can be missing. Treatment:

- In the primary or mixed dentition "Pedo" partial dentures can be placed to replace the missing teeth.
- In the permanent dentition orthodontics, bonded prosthetics and implants are used to replace the missing teeth.

### **Early Tooth Loss and Space Maintenance**

#### **Anterior Tooth Loss**

Early tooth loss in the anterior region can be a result of traumatic avulsion or extraction of carious or infected teeth. Unlike tooth loss



Unequal Resorption



Congenitally Missing Teeth (anodontia, hypodontia)

in the posterior region, anterior tooth loss does not result in space loss if the primary cuspids are erupted. The lack of teeth does not interfere with the child's ability to eat. However it may interfere with speech if teeth loss occurs before speech development is complete. The most valid reason to replace anterior teeth is for aesthetics as lack of teeth may harm the patient's self image. Teeth replacement can be accomplished with cemented or removable appliances. The "pedo partial" is a simple yet effective replacement for extracted anterior teeth. Orthodontic bands are fitted on the posterior molars. An impression is taken and sent to the lab with the fitted bands. Primary denture teeth, which are smaller and whiter than adult denture teeth are available to fabricate a natural looking appliance.

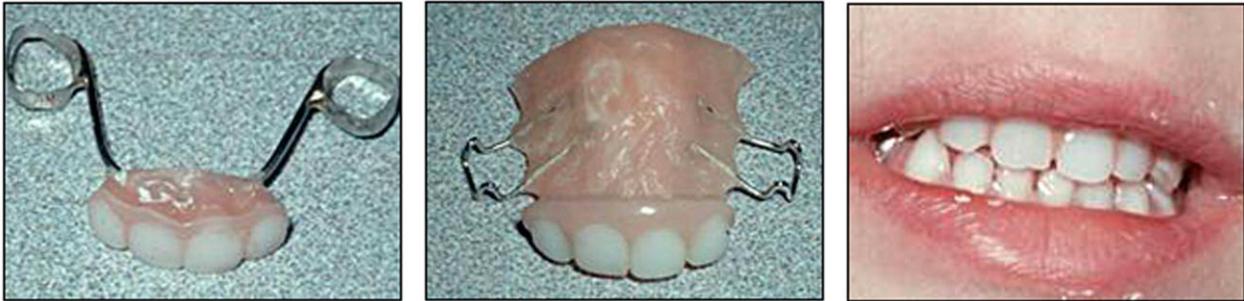
#### **Posterior Tooth Loss**

Premature loss of a posterior primary tooth results in mesial tilting of the tooth distal to the extraction space due to the mesial direction of eruption of the first permanent molar. The lack of space prevents eruption of the permanent tooth into its proper position. To maintain the space and allow normal eruption of the permanent tooth a space maintainer is placed. Depending on the location of the extraction site there are a variety of space maintainers from which to choose. Space maintainers are left in place until eruption of the permanent teeth.

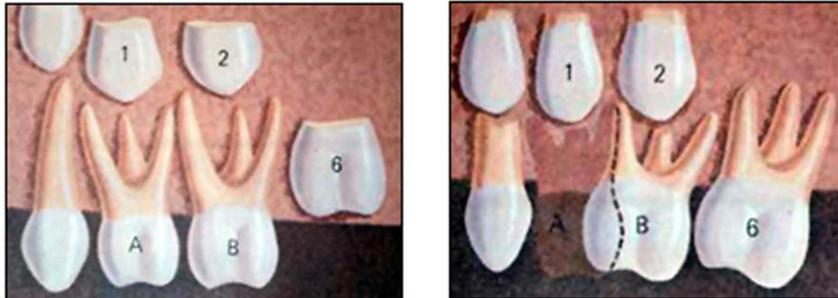
#### **Band and Loop Space Maintainer**

The indication for placement of a band and loop space maintainer is for loss of a first primary molar. A band is placed on the second primary molar and a wire loop extends to the distal of the primary cuspid. It is contraindicated to maintain the space for a





Primary Denture Teeth



Premature Posterior Primary Tooth Loss

missing second primary molar. The band and loop would extend from the first permanent molar to the first primary molar to maintain space for the second premolar. However, the first primary molar exfoliates before the second premolar erupts and the band and loop would lose its source of anchorage. Therefore a lingual or palatal holding arch should be placed. An exception to the rule is if the permanent mandibular anterior incisors are unerupted. There is a possibility that the lingual arch wire will interfere with the eruption of the incisor. In this case a band and loop space maintainer is placed temporarily. When the mandibular incisors erupt a bilateral space maintainer is inserted.

A bilateral space maintainer is indicated for loss of more than one tooth in a quadrant or loss of a second primary molar. Three examples of bilateral space maintainers are the Lingual Arch space maintainer, the Nance appliance, and the Trans Palatal Arch space maintainer.

### Lingual Arch Space Maintainer

The indications for a lingual arch space maintainer are:

- Bilateral loss of the mandibular primary molars after eruption of the permanent incisors
- Unilateral loss of more than one tooth in the mandibular arch

Its design is of bilateral bands on molars that are connected by a heavy wire that rests on the cingulum of the anterior incisors.

### Nance Appliance

The indications for a Nance appliance are bilateral loss of the maxillary primary molars or unilateral loss of more than one tooth in the maxillary arch. Its design is of bilateral bands on molars that are connected by a heavy arch wire that rests on the cingulum of the anterior incisors, in a manner similar to the lingual arch, would interfere with the occlusion of the mandibular incisors into the maxillary incisors. Instead, the arch wire is directed toward the palatal rugae and is embedded in an acrylic button resting on the soft tissue.

### Transpalatal Arch Appliance

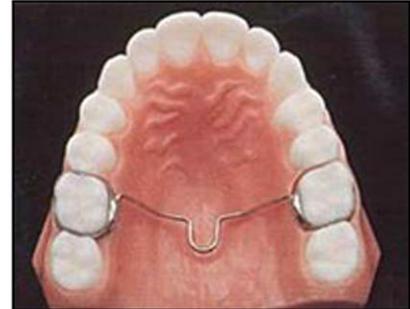
The indications for a Transpalatal Arch



Lingual Arch Space Maintainer



Nance Appliance



Transpalatal Arch Appliance

appliance is bilateral loss of the maxillary primary molars or unilateral loss of more than one tooth in the maxillary arch. Its design is of bilateral bands on molars that are connected by a heavy wire that transverses the hard palate without touching soft tissue. Although it is easier to clean than the Nance appliance it is not as stable, especially when bilateral second primary molars are missing.

### Conclusion

For the practitioner interested in attracting or maintaining children in the practice, knowledge of commonly occurring clinical situations in the primary and mixed dentitions must be attained. The material presented in this course will enable the clinician to render treatment to the pediatric dental patient and discuss with parents options should these situations arise.

## Course Test Preview

- 1. Treatment for primary herpetic gingivostomatitis includes \_\_\_\_\_.**
  - a. antipyretics
  - b. antibiotics
  - c. antivirals
  - d. A and C
- 2. How do aphthous ulcers differ clinically from primary herpetic gingivostomatitis?**
  - a. They are seen on mobile tissue.
  - b. Patients are not febrile.
  - c. Patients present with cervical lymphadenopathy.
  - d. A and B
- 3. The etiology of angular cheilitis is \_\_\_\_\_.**
  - a. mechanical irritation
  - b. fungal infection
  - c. bacterial infection
  - d. All of the above.
- 4. A child with cellulitis should be admitted to the hospital \_\_\_\_\_.**
  - a. if effective local anesthesia cannot be obtained
  - b. if there is a draining fistula
  - c. if the patient is dehydrated
  - d. if the infection involves multiple teeth
- 5. A 2 year old patient presents with a discolored maxillary primary right central incisor. The parent gives a history of the child being hit in the mouth with a toy three weeks earlier. The patient exhibits no pain or tooth mobility. A radiograph shows no periapical pathology. What is the course of treatment?**
  - a. Wait 2 months for the tooth to lighten spontaneously.
  - b. Place the child on an antibiotic for 10 days.
  - c. Perform a pulpectomy.
  - d. Extract the tooth.
- 6. A 7-year-old patient presents with chalky, white and gray patchy stains on her permanent central incisors and first permanent molars. The most likely etiology for the stains is \_\_\_\_\_.**
  - a. amelogenesis imperfecta
  - b. cystic fibrosis
  - c. erythroblastosis fetalis
  - d. fluorosis
- 7. A nine year old patient presents with enamel hypoplasia on the incisal third of the maxillary central incisors and the mandibular central and lateral incisors. The mother gives a history of the child having a high fever at \_\_\_\_\_.**
  - a. birth
  - b. 2 years old
  - c. 5 years old
  - d. 7 years old

8. **A five-year-old patient presents for a clinical examination. The clinician finds that the maxillary primary left central incisor appears larger than the right central incisor. The maxillary arch contains only nine teeth. The situation was caused by \_\_\_\_\_.**
- a. germination
  - b. enamel hypoplasia
  - c. fusion
  - d. congenitally missing tooth
9. **A paramolar is a supernumerary tooth found \_\_\_\_\_.**
- a. in the area of the first molar
  - b. in the area of the central incisors
  - c. in the area of the cuspids
  - d. distal to the third molar
10. **What is NOT appropriate treatment for a tooth exhibiting dens evaginatus?**
- a. Anesthetizing the tooth and totally removing the talon cusp.
  - b. Application of fluoride varnish in the treated area.
  - c. Placement of composite in the treated area.
  - d. Gradual tooth reduction of the talon cusp without anesthesia.
11. **Which statement is FALSE about teething?**
- a. It coincides with the child's loss of maternal antibodies.
  - b. Some infants exhibit drooling, low grade fever and diarrhea.
  - c. Treatment is palliative.
  - d. Symptoms first appear at one year of age.
12. **Which statement is true about early childhood caries?**
- a. It is genetic in origin.
  - b. It is first noticed on the mandibular incisors and primary second molars.
  - c. It is due to a reduction in salivary flow and swallow reflex.
  - d. It does not occur until age three.
13. **Children should be weaned off a bottle \_\_\_\_\_.**
- a. by 6 months
  - b. by 12 months
  - c. by 2 years
  - d. when they are emotionally secure to give up the bottle
14. **Thumb and finger habits should be discouraged \_\_\_\_\_.**
- a. between one to three years
  - b. between four to six years
  - c. even if the child does not want to stop
  - d. at the start of orthodontic treatment
15. **Which is an appropriate appliance for eliminating a digital habit?**
- a. Quadhelix appliance
  - b. Nance appliance
  - c. Trans Palatal Arch appliance
  - d. Lower lingual arch

- 16. Which statement is true about pacifier use?**
- a. The consequences are as pronounced as finger habits.
  - b. The earlier the pacifier is discontinued the greater the chances of dento-facial changes self correcting.
  - c. Pacifier habits are equally difficult to discontinue as a finger habit.
  - d. 40% of patients discontinue pacifier use by age five.
- 17. A natal tooth \_\_\_\_\_.**
- a. erupts within one month of birth
  - b. must always be extracted
  - c. can interfere with feeding
  - d. has normal roots
- 18. An over-retained mandibular primary incisor \_\_\_\_\_.**
- a. should be extracted as soon as the permanent tooth is discovered
  - b. is indicative of a severe metabolic disorder
  - c. is a familial trait
  - d. should be extracted if not exfoliated by age 8
- 19. An over-retained maxillary primary incisor \_\_\_\_\_.**
- a. should be extracted as soon as the permanent tooth is discovered
  - b. is indicative of a severe metabolic disorder
  - c. is a familial trait
  - d. should be extracted if not exfoliated by age 8
- 20. The treatment for an eight year old child in the mixed dentition with a 1.5 mm diastema between the permanent maxillary incisors is to \_\_\_\_\_.**
- a. refer for orthodontic treatment
  - b. close the diastema with veneers or composite
  - c. do nothing
  - d. perform a labial frenectomy
- 21. The most common permanent tooth to ectopically erupt is the \_\_\_\_\_.**
- a. maxillary central incisor
  - b. maxillary first molar
  - c. mandibular first premolar
  - d. mandibular first molar
- 22. If a primary tooth is congenitally missing, \_\_\_\_\_.**
- a. the permanent tooth will usually be missing
  - b. the permanent tooth will be delayed in erupting
  - c. replacement of the missing tooth should not be attempted until the patient is in the permanent dentition
  - d. there will be a familial history of congenitally missing teeth
- 23. When a primary anterior tooth is prematurely lost, \_\_\_\_\_.**
- a. the erupted primary cuspids will drift mesially
  - b. the child will experience difficulty eating
  - c. replacement should be considered only for speech and aesthetic reasons
  - d. there is early eruption of the permanent tooth

- 24. The space maintainer of choice for an extracted first primary molar is a \_\_\_\_\_.**
- a. band and loop
  - b. lingual arch appliance
  - c. Nance appliance
  - d. Transpalatal Arch appliance
- 25. Placement of a Lingual Arch appliance is contraindicated \_\_\_\_\_.**
- a. when a second primary molar is missing
  - b. when more than two teeth are missing in the arch
  - c. when the mandibular permanent central incisors are unerupted
  - d. in cases of severe malocclusion

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## About the Author

### Steven Schwartz, DDS



*The P&G team wishes to express its sadness over the loss of our colleague and friend, Dr. Steven Schwartz, who passed away on October 25, 2018. He was a tremendous help on impacting thousands of dental professionals through CE, making dentalcare.com one of the best CE providers in the world. He was a wonderful person! We will miss him.*

Dr. Steven Schwartz was the former director of the Pediatric Dental Residency Program at Staten Island University Hospital and was a Diplomate of the American Board of Pediatric Dentistry.