Pediatric Dental Update
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Pediatrics in Review 1994;15:311
DOI: 10.1542/pir.15-8-311

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Pediatric Dental Update

Stephen Shusterman, DMD*

**FOCUS QUESTIONS**

1. What are the major abnormalities of formation and eruption of the primary and secondary dentition?
2. What are the most important consequences of untreated dental caries?
3. What are the most cost-effective and acceptable approaches to caries prevention?
4. What is the best approach to prevention, early recognition, and timely treatment of gingivitis and periodontitis?
5. What are the principles of managing oral trauma?

**Introduction**

Pediatricians are in an ideal position to influence the oral health of their young patients, from the first prenatal interview with prospective parents and the initial newborn examination through the duration of their general pediatric care. Teeth begin calcification between 14 and 16 weeks of embryonic life, and most of the crowns of the primary teeth, as well as the occlusal edges of some permanent teeth, are calcified by birth. Early plaque removal from gum pads and erupting teeth, the use of fluoride as a dietary supplement in nonfluoridated communities, and timely visits to the dentist all will help to assure a caries-free dentition and healthy oral environment for the child of the 21st century.

Dentistry has emerged from its position as a little understood and poorly tolerated sideline of the itinerant surgeon to its status of partner in supporting total bodily health. Such gains as local anesthesia and the means to administer it painlessly, high-speed instrumentation to remove caries comfortably (albeit mechanically), bonded resins (eg, pit and fissure sealants, composite resin restorative materials) to prevent caries and esthetically restore broken or deformed teeth, and implants to replace missing teeth and to restore function and appearance have highlighted its recent evolution. Dentistry in the 1990s is confident of its ability to control oral disease, but remains dependent on pediatricians and family practitioners for support in influencing patients and their parents about the systemic importance of a healthy and functional dentofacial complex.

**Developmental and Eruption Anomalies**

At birth, infants usually are clinically edentulous, but within the jaws are the immature forms of most of the primary and many of the secondary teeth. Several anomalies should be recognized in the newborn mouth. In examining a baby, the pediatrician may find clear or bluish fluid-filled sacs, sometimes bilaterally or quadrilaterally, on the gum pads. These dental lamina cysts generally are not painful, are not surrounded by erythematous tissues, do not interfere with feeding, and disappear after several weeks. Yellowish-white, slightly raised cysts on the alveolar ridges are referred to as Bohn nodules and those near the midpalatal raphe at the junction of the hard and soft palates as Epstein pearls. They represent islands of epithelial cells left over from the embryonic formation of the dental lamina or palatal fusion. These cysts are common, will disappear, and require no treatment.

Teeth present at or shortly after birth are referred to as natal teeth. In a 1984 study, Kates et al found natal teeth in 13 of 18 infants surveyed (1:1400), all in the mandibular incisor area. Natal teeth generally are poorly formed, have thin hypoplastic enamel, and sometimes are at the end of a stalk of granulomatouslike uncalcified tissue, which is friable and extremely mobile. If natal teeth are present in the lower anterior gum, they may irritate and ulcerate the dorsum of the tongue, or they may interfere with nursing by irritating the mother's breast or disrupting sucking. If natal teeth are causing significant ulceration or if there is a clear danger of aspiration, the teeth should be removed (Figure 1). However, they generally represent primary teeth that may have formed superficially and erupted early and, therefore, will not be replaced. Kates et al noted that 95% of the natal teeth in their survey were normal primary incisors and only 5% were supernumerary (extra) teeth. If removed, space may be lost for permanent successors, and years later orthodontic treatment may be necessary. Natal teeth are particularly common in children who have a cleft lip and palate, where the pathogenesis of the anomaly may disrupt the dental lamina, resulting in superficial placement of primary tooth buds.

Primary teeth begin eruption at approximately 6 months of age, but the range may vary between 3 and 16 months. At this age, a child who has no teeth but is developing normally and meeting his or her other milestones should be examined by a dentist. Dental radiographs are not necessary unless there is reason to believe that there is a pathologic process and the child can be held motionless so that the film will be diagnostic. Mandibular teeth generally erupt first, and the sequence for the primary teeth is the central incisor, lateral incisor, first molar, canine, and second molar.

All primary teeth usually have erupted by age 3 years, and the process of root resorption then begins for their replacement by secondary (permanent) teeth. The first visit for routine dental treatment should be at this time, if the child has not been seen earlier for preventive care or

![FIGURE 1. A newborn infant of several days of age displays neonatal teeth and severely ulcerated dorsum of tongue.](image-url)
management of traumatic injury to the teeth. It is important to realize that the space occupied by the primary dentition (20 teeth), as measured from the distal surface of one second molar around the arch to the distal surface of the other second primary molar, will be the space available for the 20 succedaneous permanent teeth. The face will grow downward and forward from the cranial base, but growth in the mouth will occur behind the primary dentition to accommodate the 12 accessional teeth (permanent first, second, and third molars). Statistically, the perimeter of the primary dental arch will become slightly smaller due to anterior vectors of force and medial drift during tooth eruption. Any additional space lost as a result of caries or crowding may create the necessity for orthodontic realignment.

At or about 6 years of age, the first permanent molars erupt distal to the primary dentition, and the permanent incisors replace the primary incisors. From that point until the exfoliation of the last primary teeth, between 12 and 14 years of age, the dentition is referred to as “mixed” and after that as the “permanent” dentition. Third molars, “wisdom teeth,” which may erupt in late adolescence, are blamed for many dental problems, including crowding and temporomandibular joint pain. Many people do not have adequate space medial to the mandibular ramus or in the retromolar pad area of the maxilla to accommodate these teeth. The third molar may erupt partially (partial impaction) or remain totally impacted (unerupted). Removal may be necessary due to pericoronial infection or other degenerative changes, but usually not before late adolescence. Early attempts at third molar removal in younger children are complicated, and morbidity is high.

Several conditions may alter the eruption of teeth. In some cases, there may be agenesis of individual teeth, commonly maxillary permanent lateral incisors or mandibular second premolars, or multiple teeth may be missing (oligodontia). Oligodontia is found in Down syndrome, incontinentia pigmienti, and ectodermal dysplasia (Figure 2). In this latter condition, the teeth that are present are conically shaped, dysmorphic, and may have short conical roots. Missing primary teeth may need to be replaced prosthodontically for esthetic or functional reasons. Extra (supernumerary) teeth commonly are found in the maxillary anterior midline and may interfere with eruption of permanent incisors. Anterior and posterior multiple supernumerary teeth are found in cleidocranial dysostosis and Gardner syndrome. Supernumerary teeth that interfere with eruption must be removed. If they are not interfering, they may be left until the adjacent permanent tooth roots have completed formation, at which time they are removed surgically; in rare cases, they are left in place. In some cases, supernumerary teeth erupt and may be removed easily.

Finally, systemic disease or endocrine malfunction may accelerate or retard eruption. Endocrine disturbances of growth, such as hypothyroidism or hypopituitarism, usually are reflected in a delayed eruption of teeth, but endocrine disorders such as functioning ovarian tumors may cause an acceleration in dental development. In both cases, teeth are normal in size and morphology. Severe metabolic disturbances, such as nephrotic syndrome, which have their onset during the formation of permanent teeth, may result in a linear pattern of hypoplasia that affects the dentition in those areas forming during the acute metabolic disturbance. This phenomenon is similar to the staining that occurs in teeth undergoing calcification during the administration of tetracycline drugs, when the drug is incorporated into the developing tooth structure. Extrinsic stains such as iron (gray or green) or postantibiotic stain (orange or brown) usually can be removed; intrinsic staining is permanent.

Dental Caries and Periodontal Disease—Infectious Processes

According to a 1989 report by the National Institute of Dental Research, 49.9% of children ages 5 to 7 were caries-free compared with 36.6% in a 1979 to 1980 survey. The trend shown in earlier studies continues downward, with an increase of almost 4 million caries-free children since 1980. However, the remaining 50% of children did have some caries, with almost 80% of 15- to 17-year-olds having at least one decayed, missing, or filled tooth surface. Early loss of tooth structure not only results in loss of space through drifting and tipping, but may result in masticatory and nutritional problems; psychological problems caused by the premature loss or disfigurement of teeth; pain, swelling, and infection; and speech problems. In addition, teeth that are aligned poorly or crowded are more at risk for periodontal disease, another infectious process that may have roots in childhood.

Nursing-Type Caries

One of the earliest manifestations of a significant caries process is “nursing-type caries” (Figure 3). This classic pattern of caries begins on the smooth surfaces of the maxillary incisors (facial or palatal surfaces), spreads posteriorly to involve the smooth (cheek) surfaces of the maxillary primary molars, and then inferiortly and posteriorly to involve the smooth (cheek) surfaces of the man-
Dental caries

In the more common caries process, decay begins in the deep occlusal pits and fissures of the molars or interproximally, when posterior teeth contact, just below the contact area. The process is marked by an initial decalcification or white spot, which, if left untreated, erodes as the caries spreads through the enamel to the dentin. Unlike enamel, the dentin is tubular in structure, enclosing an organic projection from the odontoblast that lines the pulpal chamber. Invasion of the dentin may provide the first sensitivity or pain, but it is not unusual for children to have extensive caries and never to complain of pain.

Once caries has spread from the dentin to the pulp, which is composed of nerve, blood supply, and fibrous connective tissue, the classic inflammatory process spreads. Because this is a small, confined space, fluid collects rapidly, necrosis occurs, and pain may result. As infection spreads into the periradicular space, the tooth becomes mobile, and pus may perforate the thin cortical plate of bone, resulting in a draining fistula or “parulis.” In the mandible, if infection spreads from a molar to the fascial spaces below the insertion of the mylohyoid muscle, swelling may spread below the tongue and across the floor of the mouth, eventually elevating the tongue and causing respiratory embarrassment. Due to the anatomic position of primary molars, this condition, “Ludwig angina,” usually is not seen in children younger than 7 years. In the maxilla, infection may spread upward and backward, involving the space below the infraorbital ridge, eventually involving the periorbital and supraorbital spaces and closing the eye (Figure 4). Infection of a maxillary tooth spreading in this manner may result in sinus infection, cavernous sinus thrombosis, and brain abscess.

The antibiotic of choice in odontogenic infection is penicillin V (250 to 500 mg po every 6 hours, 50 mg/kg per day); erythromycin (200 to 400 mg po every 6 hours, 40 mg/kg per day) may be used for patients who are allergic to penicillin. Respiratory embarrassment or cavernous sinus infection is rare in children, but dehydration and sepsis may occur more frequently. Because these complications develop very rapidly, children who have odontogenic infection and obvious facial cellulitis should be admitted to the hospital for intravenous antibiotic coverage and close monitoring when signs of toxicity and increasing dehydration are noted.

Gingivitis and periodontitis

Gingivitis, an early and reversible form of periodontal disease, is more common than previously believed in children and may precede the more progressive and irreversible form of gum disease seen in later years. Gingivitis refers to inflammation of that portion of the gingiva (gum) just adjacent to the tooth, while periodontitis refers to more widespread and extensive inflammation of the gingiva and supporting bone. The earliest form of gingivitis is associated with the erupting tooth and disappears fol-

FIGURE 4. Facial cellulitis (A) resulting from carious teeth (B).
MOUTH AND TEETH
Dental Update

Following emergence of the tooth. Just prior to eruption, it is not uncommon to find a bluish, fluid-filled sac overlying the tooth (eruption "cyst"), an indication of minimal blood accumulation in the dental sac just prior to eruption. The eruption "cyst" or hematoma (not a true cyst) usually disappears shortly after eruption and almost never requires treatment.

After eruption, however, the accumulation of "plaque" (a sticky combination of food debris, bacteria, and saliva) on the tooth surface just adjacent to the gingiva may initiate a more serious form of gingivitis. In a recent survey conducted by the National Institutes of Health, the incidence of milder-to-moderate gingival inflammation was found to be 92% among schoolchildren; 3% of the children surveyed had more serious disease that required treatment.

A more virulent form of periodontitis found in children is juvenile periodontitis (JP), which has been shown to be responsible for rapid loss of supporting bone and deep inflammation of the gingival tissues, particularly in the incisor and molar areas. Anaerobic microorganisms, primarily Actinobacillus actinomycetemcomitans and Capnocytophaga sp have been associated with this disease. Treatment includes surgical debridement of the infected tissues, mechanical removal of calcified deposits from the root surfaces of the affected teeth, and tetracycline therapy (these children usually are beyond the tooth-forming ages when tetracyclines might result in permanent dental staining). More commonly, eruption of permanent teeth in the mixed dentition stage may result in crowding, rotation, and malposition of some incisor teeth (usually mandibular). Because of more labial placement in the alveolar bone and the difficulty in maintaining adequate hygiene in these areas, gingival irritation is common and persistent and may result in severe inflammation, apical migration, and loss of bony support for these teeth. Treatment to prevent the loss of periodontal support is urgent and includes removal of the local irritants, reduction of early crowding (perhaps by the selective removal of appropriate primary teeth), and replacement of lost gingival tissue by autologous gingival grafting.

Frenum attachments also have been implicated in early mucogingival problems (Figure 5). Frena, which tightly bind the upper lip to the gingiva labial to the maxillary incisors, or the tongue to the lingual tissues between the mandibular incisors, may exert intolerable tensions on these tissues. This causes gingival stripping and loss of periodontal support. In infancy, the labial, and less frequently the lingual, frenum are attached high on the alveolar ridges (gum pads), but they migrate apically with increasing age. Few actually require treatment. Frena should be treated surgically in infancy only when the tongue is very tightly attached to the gum and interfering with feeding. The labial frenum usually is not treated until early adolescence after the permanent canine teeth have erupted, when gingival degradation or a diastema between the incisors is evident. Surgical management in both cases must involve the dissection and removal of the muscle insertion between the incisors (not a simple "snipping") to relieve the gingival stripping and prevent recurrence. Frenectomy should be considered carefully and performed only when clearly indicated.

Preventive Dentistry

In recent years, dentistry has made great strides in preventing oral disease, but must do more to reach those still affected by caries as well as to focus on other areas such as periodontal disease and malocclusion. Early infant oral health is a goal of the American Academy of Pediatric Dentistry, and although clear scientific evidence to support "healthy baby" visits to the dentist may be lacking, new parents must be made aware of the rationale for good oral hygiene, the possible effects of prolonged or excessive nursing, the negative effects of thumb and pacifier sucking, the use of mouthguards during athletic activities, and the benefits of appropriate fluoride supplementation.

TEETH CLEANING

Infants collect plaque on their gum pads prior to the eruption of teeth and will continue to accumulate plaque on the surfaces of newly emergent teeth. Gingival irritation and caries are possible sequelae of this accumulation, and parents should be counseled to clean the gum pads of their new infants, just as they bathe and clean other body parts. A clean, moist washcloth or gauze pad, squeezed between the fingers and run transversely across the gum pads to remove milk curd and food debris, is adequate for the predentate infant.

After the eruption of their child's first teeth, parents gradually change to a soft, multitufted toothbrush. Parents should assist their child in brushing (through the first or second grade or until the child can demonstrate adequate dexterity and persistence) by standing or sitting behind him or her and tipping the head backward against them onto their laps. This stabilizes the head and prevents movement, gives access and viability, and allows cleaning of the teeth without trauma or gagging. Minimal quantities of dentifrice are necessary, and it may be entirely omitted at first. New parents also should be counseled on factors in the diet that will contribute to dental caries, such as excessive nursing and adherent snack foods.

PACIFIERS AND THUMB SUCKING

An important part of infant dental counseling is the issue of pacifier versus thumb sucking. Little evidence exists to support the use of the so-called orthodontic (Nuk®) pacifier over the conventional pacifier. Unpublished data indicate more severe malocclusion as a result of dummy (pacifier) sucking. A recent paper in the Journal of Pediatric Dentistry in-
dicated greater overjet (protrusion) from the orthodontic pacifier and more open-bite (anterior teeth not in occlusion) from the conventional pacifier. Certainly, the availability of the thumb and the sensation of double gratification (thumb and palate) help infants to satisfy their sucking instinct, but thumbsucking seems to persist longer and is more difficult to stop. Pediatric dentists would prefer neither habit, but when present, consider sucking habits relatively normal, even when they persist into early school grades. Open bites (Figure 6) and crossbites (malocclusions where teeth are reversed in their usual labiolingual relationships) are not unusual after prolonged sucking habits, but are readily correctable, as opposed to the lasting psychological implications caused by deprivation or forced cessation. If the sucking habit stops prior to the eruption of the permanent incisors, the new teeth are more likely to erupt into a normal position. Gross maxillary protrusion or mandibular retrusion probably stops prior to the eruption of the permanent incisors, the new teeth are opposed to the lasting psychological habits, but are readily correctable, as opposed to the lasting psychological implications caused by deprivation or forced cessation. If the sucking habit stops prior to the eruption of the permanent incisors, the new teeth are more likely to erupt into a normal position. Gross maxillary protrusion or mandibular retrusion probably stops prior to the eruption of the permanent incisors, the new teeth are opposed to the lasting psychological habits, but are readily correctable, as opposed to the lasting psychological implications caused by deprivation or forced cessation. If the sucking habit stops prior to the eruption of the permanent incisors, the new teeth are more likely to erupt into a normal position.

FLUORIDE

Fluorides have been proven effective in the reduction of dental caries. The most economical method of fluoridation is through the public water supply, and when that is not available, the use of dietary supplementation according to the guidelines (Table) approved by the American Academy of Pediatrics. In recent years, questions surrounding issues of safety in public water supplies have led to increased use of bottled water. In addition, the benefits of breastfeeding over prepared or reconstituted infant formulas have raised concerns about "supplementing" infants and children who otherwise would be ingesting fluoridated water.

Fluorosis, a staining or mottling of the dental enamel due to excessive fluoride ingestion, is being identified with increasing frequency in newly erupted teeth. Systemic fluorides are available from many sources, such as topical rinses and gels, dentifrices, and bottled waters containing natural fluoride or bottled drinks prepared in communities having fluoridated water supplies. Several studies have identified fluoridated dentifrices as a source of high doses of systemic fluorides, and the use of these toothpastes should be limited to very small amounts and carefully supervised by parents. The appearance of fluorotic enamel varies from a minimal pattern of white lacy lines to opaque white tooth surfaces with interspersed brown or deep yellow patches (Figure 7). In many cases, children and their parents consider these teeth unsightly and seek treatment alternatives to mask the discolored areas.

The apparent increase in the prevalence of enamel opacities, in the absence of dental caries activity, should initiate a reconsideration of fluoride dosages and availability for young children. Dietary supplementation for infants living in a fluoridated community should be avoided, and dosages for supplemental fluoride in communities having water fluoride levels below 0.3 ppm may be revised downward to reduce the risk of fluorosis. The use of 0.25 mg of supplemental fluoride from birth through age 2 years, without regard to weight, is contrary to our usage of most other drugs and may be excessive for many. In addition, the supplementation of breastfeeding infants whose mothers live in fluoridated communities, based on the fact that breast milk may only contain trace amounts of fluoride, also may be unnecessary. Fluoride requirements at these ages are very low (0.05 to 0.07 mg/kg), and even the low fluoride concentration in breast milk may be sufficient for early dental development. Later fluoride supplementation during enamel maturation of the permanent dentition (2 to 4 years) may be more important. Pediatricians and pediatric dentists must emphasize the importance of fluoride in the formation of a healthy dentition, but should be sensitive to its wide availability and its relationship to the apparent increase in enamel opacities.

MOUTHGUARDS

Any discussion of prevention is not complete without mention of athletic mouthguards. When worn, mouthguards may prevent injury to the teeth as well as concussion by cushioning the interface between upper and lower jaws. Mouthguards should be considered mandatory equipment in any organized sport where contact might be anticipated, including foot-

<table>
<thead>
<tr>
<th>FLUORIDE CONTENT OF DRINKING WATER (PPM)</th>
<th>BIRTH TO AGE 2 Y (MG)</th>
<th>AGE 2 TO 3 Y (MG)</th>
<th>AGE 3 TO 13 Y (MG)</th>
</tr>
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<tbody>
<tr>
<td>&lt; 0.3*</td>
<td>0.25</td>
<td>0.50</td>
<td>1.00</td>
</tr>
<tr>
<td>0.3-0.7</td>
<td>0</td>
<td>0.25</td>
<td>0.50</td>
</tr>
<tr>
<td>≥ 0.7</td>
<td>Fluoride supplements not indicated</td>
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</tbody>
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*In process of modification by the American Academy of Pediatrics to 0 for birth to age 6 mo, 0.25 mg for age 6 mo to 3 y, 0.50 mg for age 3 y to 6 y, and 1.0 mg for 6 y and older.

ball, hockey, basketball, and lacrosse. In children in the primary or mixed dentition phases, mouthguards of the boilable or moldable type, which may be purchased off the shelf in sporting goods stores, are acceptable and economical and may be replaced easily as the dentition changes. It cannot be emphasized enough that mouthguards are effective only when they are worn; their construction so as to allow rapid breathing, shouted instructions, and comfort is critical. Pediatric dentists stand ready to advise and help parents and coaches, and pediatricians can encourage the use of these guards.

**Trauma**

Although many accidents to the dentition are preventable, fractured, displaced, or avulsed teeth are common in childhood, occurring at any time after the child first stands or walks. Displaced teeth may be repositioned or may heal without treatment. Avulsed primary teeth should not be reimplanted because successful reattachment is very unlikely and the permanent tooth will be at risk. Discoloration of primary teeth as a sequel to trauma is common, but discoloration alone, in the absence of other signs and symptoms of degeneration, does not necessarily require treatment. Discoloration may be indicative of pulpal bleeding, but the tooth may remain asymptomatic and apparently vital until exfoliation. Children who have traumatized teeth should be referred to the dentist for evaluation, and appropriate radiographs should be taken to identify root fractures, displacement, and proximity or changes in the permanent dentition.

Fractures of teeth are classified according to the degree of involvement of tooth structure: enamel (class I); enamel and dentin (class II); enamel, dentin, and pulp (class III); and root fractures. Because enamel, the outer covering of the tooth, has no direct connection to the pulp, no sensitivity is elicited in minimal fractures involving only the enamel. However, any trauma should be investigated promptly by the dentist, who will evaluate the extent of the injury. It may not be possible to determine the full extent of the injury without a radiograph to determine root integrity and maturity.

A class II or III fracture involving the dentin or dental pulp requires immediate treatment to maintain the vitality of the pulp and to preserve the tooth. Exposed dentin is covered with calcium hydroxide ($\text{Ca(OH)}_2$) to stimulate healing, and the $\text{Ca(OH)}_2$ is covered by a bonded resin splint (“band-aid”). If the pulp is exposed, it must be treated promptly. In immature root formation, the exposed pulp may be partially amputated and treated with $\text{Ca(OH)}_2$ to promote vital maturation; in mature and complete root formation, endodontics (root canal therapy) is the treatment of choice.

When the root is fractured (a condition that may not be obvious from looking at the tooth), the fracture may be reduced manually, the tooth splinted (bonded) to adjacent teeth, and the splint left in position for several weeks until healing (an osteodontin bridge forms at the site of the fracture) takes place. Root canal therapy may be necessary on the more proximal portion, although the distal segment may remain vital.

Restoration of the immature or young tooth to a normal appearance and function is possible using “bonding techniques” (Figure 8). In bonded restorations, the surface of the tooth is prepared and etched with mild phosphoric acid; an unfilled resin is applied to the surface; and a filled composite resin is added, shaped, and polished to appear as if the tooth is normal. In these restorations, the surface of the tooth is changed only minimally, the treatment is accomplished at one session, the expenses and tooth preparation for full crowns are avoided, the gingival contour and maturity of the tooth is not an issue, and the esthetics and function are restored. Bonded restorations lack edge (crushing) strength, particularly when exposed to nail-biting, but longevity and color stability are excellent, and replacement should not become necessary until many years later.

Avulsion of permanent teeth represents a severe challenge for the dentist. Reimplantation is extremely time-dependent, and after 30 minutes, the chances of success decrease rapidly. Avulsed teeth should not become desiccated, nor should they be cleaned or debrided aggressively, which will make the periodontal ligament (the soft tissue interface between root and alveolar bone) less vital. The tooth should be rinsed in plain water or saline solution and gently placed back into the socket. These patients should be instructed to close their teeth into a gauze sponge and to see the dentist immediately. If the situation prevents replacement of the tooth in the empty socket, placing it in cold milk is an acceptable interim solution for the trip to the dentist. The dentist will rinse and replace the tooth, if it is not already in its socket, and splint the tooth to adjacent teeth by using wire or bonded resins. After 1 week, the tooth is opened, pulpal contents are removed, and $\text{Ca(OH)}_2$ is placed into the pulp canal to maintain root integrity and stimulate root completion. Possible complications include root resorption due to a reactive inflammation or replacement by osteoid tissue with or without bony ankylosis. Success often is short-lived and measured in terms of normal eruption of adjacent teeth or maturation until an age when prosthetic replacement is possible. Pediatricians and dentists should be certain that tetanus boosters are current and prescribe antibiotics (penicil-
lin or erythromycin) to prevent secondary infection.

**Special Patients**

Extremely young, systemically ill, and immunosuppressed children and those who have congenital anomalies comprise a special group of patients whose needs for treatment are unique and who benefit from the combined treatment of physicians and dentists. Very young children who have severe dental caries may not tolerate restorative treatment in the usual chairside manner. Because of the costs and risks, general anesthesia as an adjunct to restorative treatment is reserved for patients who require extensive treatment, who are unable to tolerate chairside treatment, or who by reason of physical, emotional, or mental handicap will not tolerate outpatient dental care. General anesthesia and treatment in the main operating suite of a hospital is acceptable for restoring these children’s dentitions to relative dental health, but it cannot be a crutch on which a parent may lean for ease of treatment. Parents must understand the risks and be willing to assume their own responsibility in assuring that this modality of treatment will not be necessary again. This treatment approach must be reserved for truly indicated cases; a 10-year-old child brought to the dentist to be “put to sleep” to have his teeth restored is not an appropriate recipient for this form of treatment. Sedation with adequate monitoring is a viable option for some of these patients and provides a less expensive and less risky alternative for limited restorative requirements.

Patients who have systemic disease should not be at increased risk of dental infection. However, they must be educated to understand the necessity for maintaining good dental health or be referred for treatment as soon as that need is recognized. Patients who have significant cardiac disease, such as ventricular septal defects, tetralogy of Fallot, or valvular prostheses, are at risk for bacterial endocarditis from dental infection and should have restoration under prophylactic antibiotic coverage prior to developing acute needs. In these patients, antibiotic SBE coverage is necessary for all dental procedures that may produce a transient bacteremia, including routine prophylaxis, according to the recommendations of the American Heart Association. Similarly, patients who have renal disease or indwelling shunts or catheters also may be at risk for infection and should be maintained in a state of sound dental health and prescribed antibiotics prophylactically during treatment. Those who have hemophilia and other bleeding diatheses may be treated safely with factor replacements or plasma infusions, and clot breakdown after extraction may be prevented further by use of epsilon aminocaproic acid 100 mg/kg for several days.

Patients undergoing chemotherapy or awaiting bone marrow transplant frequently suffer from oral ulcerations, which are extremely painful. Oral rinses containing chlorhexidine reduce plaque accumulations and promote healing; modified oral hygiene techniques further reduce inflammation. As in the case of those who have cardiac disease, the overall health of these patients may be compromised further by dental infection, and each patient should have a careful dental screening prior to the initiation of treatment. Potential sources of dental infection should be eliminated. Similarly, pediatric patients who have human immunodeficiency virus infection are subject to aggressive and painful episodes of gingivitis, and their overall condition is worsened by dental infection. Scrupulous hygiene and restorative treatment before any condition reaches a critical stage may eliminate the dentition as a complication of treatment.

Finally, patients whose syndromes include craniofacial problems or patients who have cleft lip and cleft palate represent a unique opportunity for the pediatrician and pediatric dentist to provide care as members of a multidisciplinary, integrated health care team. Cleft lip and palate, which are separate (sometimes associated) entities, occur during the same embryologic period as the initiation and development of the dentition. During development of the primary palate and lip, the failure or breakdown of the fusion of medial and lateral nasal processes with the maxillary process affects the dental alveolus in the area of the lateral incisors. The insult to the dentition may involve the teeth and supporting alveolar bone from the central incisor to the canine tooth, and in the cases of bilateral cleft lip and palate, may affect both sides of the dentition. This congenital anomaly affects approximately 1 in 800 live caucasian births, with a significantly higher incidence among Asians and lower incidence among African-Americans; males are affected more frequently than females, and in unilateral clefts, the left side is affected more frequently than the right.

At birth, immediate concerns focus on nutrition and surgical correction, with a greater concern over the patency of the airway in Pierre Robin syndrome (cleft palate, macroglossia, retrognathia with glossoptosis). Pediatric dentists may assist the feeding process or enhance the plastic surgical repair by constructing intraoral appliances to obliterate the palate or dentofacial orthopedic appliances to mold the palatal segments and relieve pressure on the lip prior to surgery.

Patients who have oral clefts present many dental challenges, including the absence of teeth (oligodontia); the presence of multiple supernumerary teeth in the area of the cleft alveolus and palate; enamel hypoplasia and gross deformities of teeth adjoining the alveolus.
teeth, correction of malocclusions via interceptive and fully corrective orthodontics, prosthetics to replace missing teeth, and maxillofacial surgery to correct gross skeletal discrepancies of maxilla and mandible. The pediatric dentist, along with the pediatrician, is key to informing the parents and supporting the early growth and development of the patient who has a cleft lip/palate and functioning as a member of a team that includes the plastic surgeon, orthodontist, speech pathologist, otolaryngologist, audiologist, geneticist, nurse feeding specialist, and pediatrician.

Other congenital anomalies of the craniofacial complex requiring the team approach include Treacher-Collins syndrome and hemifacial microsomia, which affect the eyes, ears, vertebrae, and mandible. These patients may exhibit a lack of development of one or both sides of the mandible to varying degrees, resulting in a canted plane of occlusion and asymmetric facial development. Early dental treatment includes the surgical lengthening of the affected mandibular ramus and the growth-assisted orthodontic correction of the resultant open bite. In Crouzon or Apert syndrome (craniostenoses), there is a maxillary hypoplasia, open bite, and significant dental crowding. Each patient who has anomalies affecting the craniofacial complex must be supported with effective dietary counseling, fluoride supplementation, and home oral hygiene instruction beginning in infancy to minimize the complicating effects of the dental caries process.

**Conclusion**

It is important that all pediatricians have a thorough understanding of oral disease and its consequences to the total health of the child. As the director of health care for the infant, the pediatrician usually is the first to give dental advice to a parent and may be the first to recognize the need for the assistance of the oral health specialist, the dentist. Pediatric dentists, trained in growth and development, behavioral sciences, and hospital services, stand ready as partners to serve on the child’s health care team.

**SUGGESTED READING**


**FIGURE 9. An 8 1/2-year-old male has a repaired unilateral cleft lip and palate (A). The greater palatal segment is malpositioned and the teeth are rotated and malpositioned prior to bone grafting and alignment of teeth (B).**
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