
11. PEDIATRIC DENTISTRY AND ORTHODONTICS

Andrew L. Sonis, D.M.D.

1. What is the current schedule of systemic fluoride supplementation?

Fluoride Supplementation

AGE	FLUORIDE CONCENTRATION IN LOCAL WATER SUPPLY (ppm)		
	< 0.3	0.3 – 0.6	> 0.6
6 months to 3 yr	0.25 mg/day	0	0
3 -6 yr	0.50 mg/day	0.25 mg/day	0
6 – 16 yr	1.00 mg/day	0.50 mg/day	0

2. Are children born with *Streptococcus mutans*?

Children are not born with *S. mutans* but rather acquire this caries-causing organism between the ages of about 1 and 3 years. Mothers tend to be the major source of infection. The well-delineated age range of acquisition is referred to as the "window of infectivity."

Caufield PW, Cutter GR, et al: Initial acquisition of mutans streptococci by infants: Evidence for a discrete window of infectivity. *J Dent Res* 72:37–45, 1993.

3. What variable is the best predictor of caries risk in children?

Past caries rates are the single best predictor in assessing a child's future risk.

Disney JA, Graves RC, et al: The University of North Carolina Caries Risk Assessment Study: Further developments in caries risk prediction. *Community Dent Oral Epidemiol* 20:64–75, 1992.

4. What is the earliest macroscopic evidence of dental caries on a smooth enamel surface?

A white-spot lesion results from acid dissolution of the enamel surface, giving it a chalky white appearance. Optimal exposure to topical fluorides may result in remineralization of such lesions.

5. Which teeth are often spared in nursing caries?

The mandibular incisors often remain caries-free as a result of protection by the tongue.

6. Does an explorer stick necessarily indicate the presence of caries?

Several studies have demonstrated that an explorer stick more often than not is due to the anatomy of the pit and fissure and not the presence of caries.

It has been suggested that “sharp eyes” are more important than “sharp explorers” in detecting pit and fissure caries.

7. Is prenatal fluoride supplementation effective in decreasing caries rate in the primary dentition?

No. No studies to date support the administration of prenatal fluorides to protect the primary dentition against caries.

8. Do home water filtration units have any effect on fluoride content?

Absolutely. For example, reverse-osmosis home filtration systems remove 84%, distillation units remove 99%, and carbon filtration systems remove 81% of the fluoride from water.

Brown MD, Aaron G: The effect of point-of-use water conditioning systems on community fluoridated water. *Pediatr Dent* 13:35—38, 1991.

9. Why has the prevalence of fluorosis increased in the United States?

The increased prevalence is likely due to three factors: (1) inappropriate fluoride supplementation; (2) ingestion of fluoridated toothpaste (most children under age of 5 years ingest all of the toothpaste placed on the toothbrush); and (3) high fluoride content of bottled juices. For example, white grape juice may have fluoride concentrations greater than 2 ppm.

10. What are the common signs of acute fluoride toxicity?

Acute fluoride toxicity may result in nausea, vomiting, hypersalivation, abdominal pain, and diarrhea.

11. What is the first step in treating a child who has ingested an amount of fluoride greater than the safely tolerated dose?

In acute toxicity, the goal is to minimize the amount of fluoride absorbed. Therefore, syrup of ipecac is administered to induce vomiting. Calcium-binding products, such as milk or milk of magnesia, decrease the acidity of the stomach, forming insoluble complexes with the fluoride and thereby decrease its absorption.

12. What is the appropriate amount of toothpaste to apply to the toothbrush of a preschool child?

Because preschool children tend to ingest all of the toothpaste on the toothbrush, no more than a pea-sized drop should be applied. Although the ingestion of even greater amounts of toothpaste does not represent a health risk, it may result in clinically evident fluorosis of the permanent dentition.

13. What are the indications for an indirect pulp cap in the primary dentition?

Because of the low success rate, most pediatric dentists believe that indirect pulp caps are contraindicated in the primary dentition.

14. Which branchial arch gives rise to the maxilla and mandible?

The first branchial or mandibular arch gives rise to the maxilla, mandible, Meckel's cartilage, incus, malleus, muscles of mastication, and the anterior belly of the digastric muscle.

15. How does the palate form?

The paired palatal shelves arise from the intraoral maxillary processes. These shelves, originally in a vertical position, reorient to a horizontal position as the tongue assumes a more inferior position. The shelves then fuse anteriorly with the primary palate, which arises from the median nasal process posteriorly and with one another. Failure of fusion results in a cleft palate.

16. When do the primary teeth develop?

At approximately 28 days in utero, a continuous plate of epithelium arises in the maxilla and mandible. By 37 days in utero, a well-defined, thickened layer of epithelium overlying the cell-derived mesenchyme of the neural crest delineates the dental lamina. Ten areas in each jaw become identifiable at the location of each of the primary teeth.

17. After the eruption of a tooth, when is root development completed?

In the primary dentition, root development is complete approximately 18 months after eruption; in the permanent dentition, the period of development is approximately 3 years.

18. How should dosages of local anesthetic be calculated for a pediatric patient?

Because children's weights vary dramatically for their chronologic age, dosages of local anesthetic should be calculated according to a child's weight. A dosage of 4 mg/kg of lidocaine should *not* be exceeded in pediatric patients.

19. Should the parent be allowed in the operatory with the pediatric patient?

The debate continues. However, recent studies indicate that many pediatric dentists allow the parent to be present in the operatory.

Mascum BK, Turner C. et al: Pediatric dentists' attitudes regarding parental presence during dental procedures. *Pediatr Dent* 17:432—436, 1995.

20. What is the treatment for a traumatically intruded primary incisor?

In general, the treatment of choice is to allow the primary tooth to reerupt. Reeruption usually occurs in 2—4 months. If the primary tooth is displaced into the follicle of the developing permanent incisor, the primary tooth should be extracted.

21. What are the potential sequelae of trauma to a primary tooth?

1. Pulpal necrosis usually manifests as a gray or gray-black color change in the crown of the involved primary tooth at any time after the injury (weeks, months, years). No treatment is indicated unless other pathologic changes occur (e.g., periapical radiolucency, fistulation, swelling, or pain).

2. Damage to the succedaneous permanent tooth, including hypoplastic defects, diaceration of the root, or arrest of tooth development, also has been reported.

22. What are the advantages of fixed vs. removable orthodontic appliances?

Fixed orthodontic appliances offer controlled tooth movement in all planes of space. Removable appliances are generally restricted to tipping teeth.

23. What is the straightwire appliance?

The straightwire appliance is a version of the edgewise appliance with several features that allow placement of an ideal rectangular archwire without bends (a so-called straightwire). These features include (1) variations in bracket thickness to compensate for differences in the labiolingual position and thickness of individual teeth; (2) variations in angulation of the bracket slot relative to the long axis of the tooth to allow mesiodistal differences in root angulation of individual teeth; and (3) variations in torque of the bracket slot to compensate for buccal-lingual differences in root angulation of individual teeth.

24. What are so-called functional appliances? Do they work?

Functional appliances are a group of both fixed and removable appliances generally used to promote mandibular growth in patients with class II malocclusions. Although these appliances have been shown to be effective in correcting class II malocclusions, most studies indicate that their effects are mainly dental, with little if any effect on the growth of the mandible.

25. Is thumbsucking abnormal? Does it adversely affect the permanent dentition?

Almost all children engage in some form of nonnutritive sucking, whether it is a thumb, other digit, or pacifier. If such habits stop before the eruption of the permanent teeth, they have no lasting effects. If the habits persist, openbites, posterior crossbites, flared maxillary incisors, and class II malocclusions may result.

26. What are the indications for a lingual frenectomy?

Tongue-tie, or ankyloglossia, is relatively rare and usually requires treatment. Occasionally, however, a short lingual frenum may result in lingual stripping of the periodontium from the lower incisors, which is an indication for frenectomy. A second indication is speech problems secondary to tongue position as diagnosed

by a speech pathologist. Nursing problems have been reported in infants who were "cured" after frenectomy.

27. When should orthodontic therapy be initiated?

There is no one optimal time to initiate treatment for every orthodontic problem. For example, a patient in primary dentition with a bilateral posterior crossbite may benefit from palatal expansion at age 4 years. Conversely, the same-aged patient with a severe class III malocclusion due to mandibular prognathism may best be treated by waiting until all craniofacial growth is completed.

28. What is the difference between a skeletal and dental malocclusion?

Skeletal malocclusion refers to a disharmony between the jaws in a transverse, sagittal, or vertical dimension or any combination thereof. Examples of skeletal malocclusions include retrognathism, prognathism, openbites, and bilateral posterior crossbites. Dental malocclusion refers to malpositioned teeth, generally the result of a discrepancy between tooth size and arch length. This discrepancy often results in crowding, rotations, or spacing of the teeth. Most malocclusions are neither purely skeletal nor purely dental but rather a combination of the two.

29. If a child reports a numb lip, can you be certain that the child has a profoundly anesthetized mandibular nerve?

Children, especially young ones, often do not understand what it means to be numb. The mandibular nerve is the only source of sensory innervation to the labial-attached gingiva between the lateral incisor and canine. If probing of this tissue with an explorer evokes no reaction from the patient, a profound mandibular block is assured. No other sign can be used to diagnose profound anesthesia of the mandibular nerve.

30. Does slight contact with a healthy approximal surface during preparation of a class II cavity have any significant consequences?

Even slight nicking of the mesial or distal surface of a tooth greatly increases the possibility for future caries. Placement of an interproximal wedge before preparation significantly decreases the likelihood of tooth damage and future pathosis.

31. Why bother with restoring posterior primary teeth?

Caries is an infectious disease. As at any location in the body, treatment consists of controlling and eliminating the infection. With teeth, caries infection can be eliminated by removing the caries and restoring or extracting the tooth. However, extraction of primary molars in children may result in loss of space needed for permanent teeth. To ensure arch integrity, decayed primary teeth should be treated with well-placed restorations.

32. What is the most durable restoration for a primary molar with multisurface caries?

Stainless steel crowns have the greatest longevity and durability. Their 4.5-year survival rate is over twice that of amalgam (90% vs. 40%).

Einwag J, Dunninger P: Stainless steel crowns versus multisurface amalgam restorations: An 8-year longitudinal clinical study. Quintessence mt 27:321—323, 1996.

33. How should a primary tooth be extracted if it is next to a newly placed class II amalgam?

Two steps can be taken to eliminate the possibility of fracturing the newly placed amalgam:

1. The primary tooth to be extracted can be disked to remove bulk from the proximal surface. Care still must be taken to avoid contacting the new restoration.

2. Placing a matrix band (teeband) around the newly restored tooth offers additional protection.

34. Can composites be used to restore primary teeth?

If good technique is followed, composite material is not contraindicated. Interproximally, however, it may be quite difficult to get the kind of isolation required for optimal bonding. There is no scientific advantage to using composite instead of amalgam for such restorations, and one has to evaluate whether esthetic effects justify the additional time required for the composite technique in primary teeth.

35. Which syndromes or conditions are associated with supernumerary teeth?

Apert's syndrome

Cleidocranial dysplasia

Cleft lip and palate

Crouzon's syndrome

Down syndrome

Gardner's syndrome

Hallermann-Streiff syndrome

Oral-facial-digital syndrome type 1

Sturge-Weber syndrome

36. Which syndromes or conditions are associated with congenitally missing teeth?

Achondroplasia

Cleft lip and palate

Crouzon's syndrome

Chondroectodermal dysplasia

Down syndrome

Ectodermal dysplasia

Hallermann-Streiff syndrome

Incontinentia pigmenti

Oral-facial-digital syndrome type 1

Rieger's syndrome

37. What are the differences among fusion, gemination, and concrescence?

Fusion is the union of two teeth, resulting in a double tooth, usually with two separate pulp chambers. Fusion is observed most commonly in the primary dentition.

Gemination is the attempt of a single tooth bud to give rise to two teeth. The condition usually presents as a bifid crown with a single pulp chamber in the primary dentition.

Concrescence is the cemental union of two teeth, usually the result of trauma.

38. What is the incidence of natal/neonatal teeth?

1/2,000—3,500.

39. What is the incidence of inclusion cysts in the infant?

Approximately 75%.

40. What are the three most common types of inclusion cysts and their etiology?

1. **Epstein's pearls** are due to entrapped epithelium along the palatal rapine.

2. **Bohn's nodules** are ectopic mucous glands on the labial and lingual surfaces of the alveolus.

3. **Dental lamina cysts** are remnants of the dental lamina along the crest of the alveolus.

41. What are the most common systemic causes of delayed exfoliation of the primary teeth and delayed eruption of the permanent dentition?

Cleidocranial dysplasia	Gardner's syndrome	Vitamin D-resistant rickets
Chondroectodermal dysplasia	Down syndrome	Hypothyroidism
Achondroplasia	De Lange syndrome	Hypopituitarism
Osteogenesis imperfecta	Apert's syndrome	Ichthyosis

42. What are the most common systemic causes of premature exfoliation of the primary dentition?

Fibrous dysplasia	Cyclic neutropenia	Acatlasia
Vitamin D-resistant rickets	Histiocytosis	Gaucher's disease
Prepubertal periodontitis	Juvenile diabetes	Dentin dysplasia
Papillon-Lefèvre syndrome	Scurvy	Odontodysplasia
Hypophosphatasia	Chediak-Higashi disease	

43. What are Murphy's laws of dentistry?

1. The easier a tooth looks on radiograph for extraction, the more likely you to fracture a root tip.

2. The shorter a denture patient, the more adjustments he or she will require.

3. The closer it is to 5:00 PM on Friday, the more likely someone will call with a dental emergency.
4. The cuter the child, the more difficult the dental patient.
5. Parents who type their child's medical histories are trouble.
6. The more you need specialists, the less likely they are to be in their office.
7. When a patient localizes pain to one of two teeth, you will open the wrong one.
8. The less a patient needs a procedure for dental health, the more the patient will want it (e.g., anterior veneer vs. posterior crown).

44. What are the appropriate splinting times for an avulsed tooth, a root fracture, and an alveolar fracture?

Avulsed tooth	7 days
Root fracture	3 months
Alveolar fracture	3—4 weeks

45. What can be done to prevent impaction of permanent maxillary canines?

Within 1 year after the total eruption of the maxillary lateral incisors, either a panoramic radiograph or intraoral radiographs should be taken to determine the axial inclination of the developing permanent canine. If mesial angulation is noted, extraction of the maxillary primary canine and maxillary first primary molars may often eliminate the impaction of the maxillary canine.

46. What is the most important technique of behavioral management in pediatric dentistry?

Tell the child what is going to happen, show the child what is going to happen, and then perform the actual procedure intraorally. The major fear in pediatric dental patients is the unknown. The tell, show, and do technique eliminates fear and enhances the patient's behavioral capabilities.

47. What pharmacologic agents are indicated for behavioral control of the pediatric dental patient in an office setting?

There are no absolutely predictable pharmacologic agents for controlling the behavior of pediatric dental patients. Unless the operator has received specific training in sedation techniques for children, patients with behavioral problems are best referred to a specialist in pediatric dentistry.

48. If a primary first molar is lost, is a space maintainer necessary?

Before eruption of the six-year molar and its establishment of intercuspation, mesial migration of the second primary molar will occur, and a space maintainer is indicated to prevent space loss.

49. Do hypertrophic adenoids and tonsils affect dental occlusion?

The incidence of posterior crossbites is increased in children with significant tonsillar and adenoid obstruction. Eighty percent of children with a grade 3 obstruction have posterior crossbites.

Oulis Ci, Vadiakas GP, et al: The effect of hypertrophic adenoids and tonsils on the development of posterior crossbites and oral habits. J Clin Pediatr Dent 18:197—201, 1994.

50. When should crossbites be corrected?

Whenever a crossbite is noted and the patient is amenable to intraoral therapy, correction is indicated. Although a crossbite can be corrected at a later date, optimal time for correction is as soon as possible after diagnosis.

51. What technique may be used if a pediatric patient refuses to cooperate for conventional bitewing radiographs?

A buccal bitewing is taken. The tab of the film is placed on the occlusal surfaces of the molar teeth, and the film itself is positioned between the buccal surfaces of the teeth and cheek. The cone is directed from 1 inch behind and below the mandible upward to the area of the second primary molar on the contralateral side. The setting is three times that which is normally used for a conventional bitewing exposure.

52. What are the morphologic differences between primary and secondary teeth? How does each difference affect amalgam preparation?

1. Occiusal anatomy of primary teeth is generally not as defined as that of secondary teeth, and supplemental grooves are less common. The amalgam preparation therefore can be more conservative.

2. Enamel in primary teeth is thinner than in secondary teeth (usually 1 mm thick); therefore, the amalgam preparation is more shallow in primary teeth.

3. Pulp horns in primary teeth extend higher into the crown of the tooth than pulp horns in secondary teeth; therefore, the amalgam preparation must be conservative to avoid a pulp exposure.

4. Primary molar teeth have an exaggerated cervical bulge that makes matrix adaptation more difficult.

5. The generally broad interproximal contacts in primary molar teeth require wider proximal amalgam preparation than those in secondary teeth.

6. Enamel rods in the gingival third of the primary teeth extend occiusally from the dentinoenamel junction, eliminating the need in class II preparations for the gingival bevel that is required in secondary teeth.

53. What is the purpose of the pulpotomy procedure in primary teeth?

The pulpotomy procedure preserves the radicular vital pulp tissue when the *entire* coronal pulp is amputated. The remaining radicular pulp tissue is treated with a medicament such as formocresol.

54. What is the advantage of the pulpotomy procedure on primary teeth?

The pulpotomy procedure allows resorption and exfoliation of the primary tooth but preserves its role as a natural space maintainer.

55. What are the indications for the pulpotomy procedure in primary teeth?

1. Primary tooth that is restorable with carious or iatrogenic pulp exposure
2. Deep carious lesions without spontaneous pulpal pain
3. Absence of pathologic internal or external resorption but intact lamina dura
4. No radiographic evidence of furcal or periapical pathology
5. Clinical signs of a normal pulp during treatment (e.g., controlled hemorrhage after coronal amputation)

56. What are the contraindications for pulpotomy in primary teeth?

1. Interradicular (molar) or periapical (caries and incisor) radiolucency
2. Internal or external resorption
3. Advanced root resorption, indicating imminent exfoliation
4. Uncontrolled hemorrhage after coronal pulp extirpation
5. Necrotic dry pulp tissue or purulent exudate in pulp canals
6. Fistulous tracks or abscess formation
7. Contraindication to pulpotomy procedure

57. How does rubber-dam isolation of the tooth improve management of pediatric patients?

1. The rubber dam seems to calm the child as it acts as both physical and psychological barrier, separating the child from the procedure being performed.
2. Gagging from the water spray or suction is alleviated.
3. Access is improved because of tongue, lip, and cheek retraction.
4. The rubber dam reminds the child to open.
5. The rubber dam ensures a dry field that otherwise would be impossible in many children.

58. When do the primary and permanent teeth begin to develop?

The primary dentition begins to develop during the sixth week in utero; formation of hard tissue begins during the fourteenth week in utero. Permanent teeth begin to develop during the twelfth week in utero. Formation of hard tissue begins about the time of birth for the permanent first molars and during the first year of life for the permanent incisors.

59. What is the sequence and approximate age of eruption for primary teeth?

The primary teeth erupt in the following order: central incisor, lateral incisor, first molar, canine, and second molar. In the mandible, the primary central incisor erupts at about 7—8 months of age, the lateral incisor at about 13 months, the first molar at 16 months, the canine at 20—22 months, and the second molar at about 27—30 months. In the maxilla, the primary central incisor erupts at about 9—10 months of age, the lateral incisor at about 11 months, the first molar at 16 months, the canine at 19—20 months, and the second molar at 29—30 months.

60. What is the sequence and approximate age of eruption for permanent teeth?

In the mandible, the permanent teeth erupt as follows: first molar and central incisor (age 6—7 years), lateral incisor (age 7—8 years), canine (age 9—10 years), and first premolars (age 11—13 years). In the maxilla, the sequence and approximate ages for eruption of permanent teeth are as follows: first molar (age 6—7 years), central incisor (7—8 years), lateral incisor (8—9 years), first premolar (10—11 years), second premolar (10—12 years), canine (11—12 years), and second molar (12—13 years).

61. What is leeway space?

Leeway space is the difference in the total of the mesiodistal widths between the primary canine, first molar, and second molar and the permanent canine, first premolar, and second premolar. In the mandible, leeway space averages 1.7 mm (unilaterally); it is usually about 0.9—1.1 mm (unilaterally) in the maxilla.

62. What changes occur in the size of the dental arch during growth?

From birth until about 2 years of age, the incisor region widens and growth occurs in the posterior region of both arches. During the period of the full primary dentition, arch length and width remain constant. Arch length does not increase once the second primary molars have erupted; any growth in length occurs distal to the second primary molars and not in the alveolar portion of the maxilla or mandible. There is a slight decrease in arch length with the eruption of the first permanent molars, but a slight increase in intercanine width (and some forward extension of the anterior segment of the maxilla) with the eruption of the incisors. A further decrease in arch length may occur with molar adjustments and the loss of leeway space when the second primary molar exfoliates.

63. What is ectopic eruption? How is it treated?

Ectopic eruption occurs when the erupting first permanent molar begins to resorb the distal root of the second primary molar. Its occurrence is much more common in the maxilla, and it is often associated with a developing skeletal class II pattern. It is seen in about 2—6% of the population and spontaneously corrects itself in about 60% of cases. If the path of eruption of the first permanent molar does not self-correct, a brass wire or an orthodontic separating elastic can be

placed between the first permanent molar and the second primary molar, if possible. In severe cases, the second primary molar may exfoliate or require extraction, necessitating the need for space maintenance or space regaining.

64. When is the proper time to consider diastema treatment?

A thick maxillary frenum with a high attachment (sometimes extending to the palate) is common in the primary dentition and does not require treatment. However, a large midline diastema in the primary dentition may indicate the presence of an unerupted midline supernumerary tooth (mesiodens) and often warrants an appropriate radiograph.

The permanent maxillary central incisors erupt labial to the primary incisors and often exhibit a slight distal inclination that results in a midline diastema. This midline space is normal and decreases with the eruption of the lateral incisors. Complete closure of the midline diastema, however, does not occur until the permanent canines erupt. Treatment of residual midline space is addressed orthodontically at this time.

65. What is the effect of early extraction of a primary tooth on the eruption of the succedaneous tooth?

If a primary tooth must be extracted prematurely and 50% of the root of the permanent successor has developed, eruption of the permanent tooth is usually delayed. If >50% of the root of the permanent tooth has formed at the time of extraction of the primary tooth, eruption is accelerated.

66. Where are the primate spaces located?

In the maxilla, primate spaces are located distal to the primary lateral incisors. In the mandible, primate spacing is found distal to the primary canines.

67. What is the normal molar relationship in the primary dentition?

Historically both the flush terminal plane and mesial step have been considered normal. More recent studies demonstrate that this may not be the case, because about 45% of children with a flush terminal plane go on to develop a class II molar relationship in the permanent dentition.

68. What is meant by the term “pseudo class III”?

This term refers to the condition in which the maxillary incisors are in crossbite with the mandibular incisors. Although the patient appears to have a prognathic mandible, it is due not to a skeletal disharmony but rather to the anterior positioning of the jaw as a result of occlusion. The ability of the patient to retrude the mandible to the edge-to-edge incisal relationship is often considered diagnostic.

69. What is the space maintainer of choice for a 7-year-old child who has lost a lower primary second molar to caries?

The lower lingual arch (LLA) is the maintainer of choice. The 6-year-old molars are banded. The connecting wire lies lingual to the permanent lower incisors in the gingival third and prevents mesial migration of the banded molars. Unlike the band and loop space maintainer, the LLA is independent of eruption sequence. (The band and loop serve no purpose after the primary first molar exfoliates.)

70. What is the space maintainer of choice for a 5-year-old child who has lost an upper primary second molar to caries?

The distal shoe is the appliance of choice. This appliance extends backward from a crown on the primary first molar and subgingivally to the mesial line of the unerupted first permanent molar, thus preventing mesial migration.

71. A 4-year-old child with generalized spacing loses three primary upper incisors to trauma. What space maintainer is needed?

No space maintainer is necessary.

72. What is the best space maintainer for any pulpally involved primary tooth?

Restoring the tooth with pulpal therapy is the best way to preserve arch length and integrity.

73. If a primary tooth is lost to caries but has no successor, is it necessary to maintain space?

Sometimes it is necessary to maintain the space, sometimes it is not. The decision is based on the patient's skeletal and dental development. Either way orthodontic evaluation is of utmost importance to formulate the future plan for this space.

74. When do you remove a space maintainer once it is inserted?

The space maintainer can be removed as soon as the succedaneous tooth begins to erupt through the gingiva. Space maintainers that are left in place too long make it more difficult for patients to clean. Furthermore, it may be necessary to replace a distal shoe with another form of space maintainer once the 6-year molar has erupted to prevent rotation of the molar around the bar arm.

75. What are the various types of headgear and their indications?

There are four basic types of headgear. Each type of headgear has two major components: intraoral and extraoral. The extraoral component is what generally categorizes the type of headgear.

1. **Cervical-pull headgear.** The intraoral component of cervical-pull headgear is composed of a heavy bow that engages the maxillary molars through some variation on a male-female connector. The anterior part of the bow is welded to an extraoral portion that is connected to an elasticized neck strap,

which provides the force system for the appliance. The force application is in a down and backward direction. This headgear is generally used in class II, division 1 malocclusions, in which distalization of the maxillary molars and/or restriction of maxillary growth as well as anterior bite opening is desired.

2. **Straight-pull headgear.** The intraoral component is similar to the cervical-pull headgear. However, the force application is in a straight backward direction from the maxillary molar, parallel to the occlusal plane. Like cervical-pull headgear, this appliance is also used for the class II, division 1 malocclusions. Because of the direction of force application, this appliance may be chosen when excessive bite opening is undesirable.

3. **High-pull headgear.** The intraoral components of high-pull headgear are similar to those described above. However, the force application is in a back and upward direction. Consequently, it is usually chosen for the class II, division 1 malocclusions where bite opening is contraindicated (i.e., class II malocclusion with an open bite).

4. **Reverse-pull headgear.** Unlike the other headgears, the extraoral component of reversepull headgear is supported by the chin, cheeks, forehead, or a combination of these structures. The intraoral component usually attaches to a fixed appliance in the maxillary appliance via elastics. Reverse-pull headgear is most often used for class III malocclusions, in which protraction of the maxilla is desirable.

76. What is the basic sequence of orthodontic treatment?

1. **Level and align.** This phase establishes preliminary bracket alignment generally with a light round wire, braided archwire, or a nickel-titanium archwire.

2. **Working archwires.** This phase corrects vertical discrepancies (i.e., bite opening) and sagittal position of the teeth. A heavy round or rectangular archwire is usually employed.

3. **Finishing archwires.** This phase idealizes the position of the teeth. Generally, light round archwires are used.

4. **Retention.** Retention of teeth in their final position may be accomplished with either fixed or removable retainers.

77. What is a tooth positioner?

A tooth positioner is a removable appliance composed of rubber, silicone, or a polyvinyl material. Its appearance is not unlike that of a heavy mouthguard, except it engages both the maxillary and mandibular dentition. It is generally used to idealize final tooth position at or near the completion of orthodontic therapy. The appliance is usually custom fabricated by taking models of the teeth and then repositioning them to their ideal position. The positioner is then fabricated to this ideal setup. The elasticity of the appliance provides for minor positional changes of the patient's teeth. After completion of treatment, the positioner may be used as a retainer.

78. What is “pink tooth of Mummary”?

Pink appearance of tooth due to internal resorption.

79. What intervention is indicated when permanent maxillary canines are observed radiographically to be erupting palatally?

Extraction of the primary maxillary canine. About 75% of ectopic canines show normalization of eruption at 12 months.

Ericson S, Kuroi J: Early treatment of palatally erupting maxillary canines by extraction of the primary canines. *EurJ Orthod* 10:282—295, 1988.

80. Does teething cause systemic manifestations?

Although teething may be associated with drooling, gum rubbing, or changes in dietary intake, no evidence indicates that it causes systemic illness (e.g., diarrhea, fever, rashes, seizures, or bronchitis). Fever associated with teething in fact may be a manifestation of undiagnosed primary herpes gingivostomatitis.

King DL, Steinhauer W, Garcia-Godoy F, Elkins CJ: Herpetic gingivostomatitis and teething difficulty in infants. *Pediatr Dent* 14:82—85, 1992.

81. Should dental implants be placed in the growing child?

Generally implants should be deferred until growth is completed. In a growing child the implant may become submerged or embedded. In addition, an implant that crosses the midline may limit transverse growth.

82. Should an avulsed primary tooth be reimplanted?

No. The prognosis of reimplanted primary teeth is poor and may adversely affect the developing succedaneous tooth.

83. Why must care be taken not to “nick” the adjacent interproximal surface in preparing a class II restoration?

Damaged noncarious primary tooth surfaces are 3.5 times more likely to develop a carious lesion and to require future restoration than undamaged surfaces, and damaged noncarious permanent tooth surfaces are 2.5 times more likely to develop a carious lesion and to require future restoration than undamaged surfaces.

84. Do all discolored primary incisors require treatment?

The gray discoloration of primary teeth is usually the result of a traumatic episode. This discoloration is due to either (1) hemorrhage into the dentinal tubules or (2) a necrotic pulp. In the case of hemorrhage into the dentinal tubules, the discoloration usually appears within 1 month of the injury. Often the teeth return to their original color as the blood breakdown products are removed from the site. Discoloration due to a necrotic pulp may take days, weeks, months, or years to develop. It does not improve with time and in fact may worsen. A tooth

that is light gray may progress to dark gray. A yellow opaque discoloration is usually indicative of calcific degeneration of the pulp. Discolored teeth do not require treatment unless there is radiographic and/or clinical evidence of pathology of the periodontium (soft and/or hard tissues).

85. How stable is the orthodontic correction of crowding?

Approximately two-thirds of all patients treated for crowding experience significant relapse without some form of permanent retention. This relapse rate is about the same whether the patient is treated with a nonextraction or extraction approach; whether third molars are present, congenitally missing, or extracted; and whether treatment is started in mixed dentition or permanent dentition. Unfortunately, no variables that correlate with relapse potential have been identified. And to add further insult, relapse potential continues throughout life.

86. Does eruption of third molars cause crowding of the incisors?

No. The eruption of third molars with real or perceived increase in crowding of the incisors is coincidental. Studies have revealed that patients who are congenitally missing third molars experience the same crowding phenomenon.

87. What is the ideal molar relationship in the primary dentition?

Mesial step. Although many pediatric dentistry and orthodontic texts suggest that both the mesial step relationship and the flush terminal plane are considered normal, a longitudinal study by Bishara et al. revealed that almost 50% of flush terminal plane relationships in the primary dentition later develop into class II malocclusions.

Bishara SE, Hoppens BJ, Jakobsen JR, Kohout FJ: Changes in the molar relationship between the deciduous and permanent dentitions: A longitudinal study. *Am J Orthod Dentofac Orthop* 93:19—28, 1988.

88. Which two dentists have appeared on the cover of Time magazine?

Dr. Harold Kane Addelson, the originator of the tell-show-do technique, and Dr. Barney Clark, the first human recipient of a mechanical heart.

BIBLIOGRAPHY

1. Andreasen JO, Andreasen FM: *Essentials of Traumatic Injuries to the Teeth*. Copenhagen, Munksgaard, 1990.
2. Enlow DH: *Facial Growth*, 3rd ed. Philadelphia, W.B. Saunders, 1990.
3. Gorlin RJ, Cohen MM Jr, Levin LS: *Syndromes of the Head and Neck*. New York, Oxford University Press, 1990.
4. kaban LB: *Pediatric Oral and Maxillofacial Surgery*. Philadelphia, W.B. Saunders, 1990.
5. McDonald RE, Avery DR: *Dentistry for the Child and Adolescent*. St. Louis, Mosby, 1994.

6. Moyers R: Handbook of Orthodontics. Chicago, Year Book, 1986
7. Pinkham JR, Casamassimo PS, Fields HW, et al: Pediatric Dentistry: Infancy through Adolescence, 2nd ed. Philadelphia, W.B. Saunders, 1994.
8. Proffit W, Fields HW: Contemporary Orthodontics. St. Louis, Mosby, 1993.
9. Scully C, Welbury R: Color Atlas of Oral Diseases in Children and Adolescents. London, Mosby-Year Book Europe Limited, 1994.