Dental anomalies include variations in normal number, size, eruption, or morphology of the teeth. In this chapter these anomalies have been divided into developmental abnormalities and acquired abnormalities. The term developmental indicates that a particular anomaly occurred during the formation of the tooth or teeth. Given the complexities and interactions involved in tooth development, from initiation at about the sixth week in utero to eruption, the small number of various anomalies is surprising. Most of the defects considered are inherited. In contrast, acquired abnormalities result from changes to teeth after normal formation. For instance, teeth that form abnormally short roots represent a developmental anomaly, whereas the shortening of normal tooth roots by external resorption represents an acquired change.

**Developmental Abnormalities**

**NUMBER OF TEETH**

**SUPERNUMERARY TEETH**

**Synonyms**
Hyperdontia, distodens, mesiodens, parateeth, peridens, and supplemental teeth

**Definition**
Supernumerary teeth are those that develop in addition to the normal complement. The tooth form may be normal or abnormal. When the extra teeth have normal morphology, the term supplemental is sometimes used. Although the cause is unknown, the tendency is familial. Most cases are polygenetic and represent initial spontaneous gene mutations. When the anomaly is restricted to supernumerary teeth, it is inherited as an autosomal recessive trait. The supernumerary teeth that occur between the maxillary central incisors are mesiodens (Fig. 18-1); those occurring in the molar area are parateeth. Those that erupt distal to the third molar are called distodens or distomolar teeth (Fig. 18-2). Also, supernumerary teeth that erupt ectopically either buccally or lingually to the normal arch are peridens.

**Clinical Features**
Supernumerary teeth occur in 1% to 4% of the population. Although they may develop in both dentitions, they are more common in the permanent. Supernumerary teeth may occur anywhere in either jaw. Single teeth are most common in the anterior maxilla (mesiodens) and in the maxillary molar region. Multiple supernumerary teeth occur most frequently in the premolar regions, usually in the mandible (Fig. 18-3). The mandibular counterpart of the mesiodens is rare. Supernumerary teeth occur twice as often in males and have a greater incidence in Asians and Native Americans. They usually do not erupt but are discovered radiographically. Occasionally a patient may appear clinically to be missing one or more teeth; however, an appropriate radiographic examination may reveal a supernumerary tooth interfering with normal tooth eruption (Fig. 18-4). When a supernumerary tooth is erupted and clinically evident, it is commonly positioned outside the normal arch because of space restriction.

**Radiographic Features**
The radiographic features of the supernumerary tooth may vary from normal-appearing tooth structure to a
331 CHAPTER 18 DENTAL ANOMALIES

4 years of age, when the deciduous teeth have formed. They may be detected in the permanent dentition of children older than 9 to 12 years.

Care must be taken not to miss supernumerary teeth in the panoramic image, especially when the image of the tooth is distorted as a result of the position of the tooth outside the focal trough, for instance, in the palate. Besides the periapical intraoral examination, occlusal radiographs aid in determining the location and number of unerupted supernumerary teeth.

Differential Diagnosis
Multiple supernumerary teeth have been associated with a number of syndromes. For instance, multiple teeth, especially bicuspids, have been associated with cleidocranial dysplasia (see Chapter 29). Supernumerary teeth have also been reported in Gardner's syndrome (see Chapter 21).

Management
The management of supernumerary teeth depends on many factors, including their potential effect on the developing normal dentition, their position and number, and the complications that may result from surgical intervention. If they erupt, they can cause malalignment of the normal dentition. Those that remain in the jaws may cause root resorption or interfere with the normal eruption sequence. Follicles of unerupted supernumerary teeth occasionally develop into dentigerous cysts. All of the preceding factors

FIG. 18-1 A and B, Examples of inverted mesiodens.

A conical tooth form and, in extreme cases, to grossly deformed tooth structure. The size varies but the tooth usually is smaller than the surrounding normal dentition. The supernumerary tooth is easily identified by counting and identifying all the teeth. The supernumerary tooth can interfere with normal eruption; therefore the radiograph often reveals an unerupted permanent tooth in close proximity to the supernumerary tooth. Radiographs may reveal supernumerary teeth in the deciduous dentition (Fig. 18-5) after 3 or

FIG. 18-2 In this panoramic image distomolars or fourth molars can be seen in both maxillary quadrants as well as a supplemental molar in the left maxilla, bringing the total to five molars in this quadrant.
FIG. 18-3  Supernumerary or supplemental lateral incisors, A, and premolars, B and C.

FIG. 18-4  Examples of mesiodens that interfered with the eruption and caused impaction of permanent teeth.

FIG. 18-5  A supplemental deciduous molar (arrow).

Influence the decision to either remove a supernumerary tooth or keep it under observation.

MISSING TEETH

Synonyms
Hypodontia, oligodontia, and anodontia

Definition
The expression of developmentally missing teeth may range from the absence of one or a few teeth (hypodontia), to the absence of numerous teeth (oligodontia), to the failure of all teeth to develop (anodontia).
Developmentally missing teeth may also be the result of numerous independent pathologic mechanisms that can affect the orderly formation of the dental lamina (e.g., orofaciodigital syndrome), failure of a tooth germ to develop at the optimal time, lack of necessary space imposed by a malformed jaw, and a genetically determined disproportion between tooth mass and jaw size.

**Clinical Features**

Hypodontia in the permanent dentition, excluding third molars, is found in 3% to 10% of the population. Hypodontia is more frequently found in Asians and Native Americans. Although missing primary teeth are relatively uncommon, when one tooth is missing, it is usually a maxillary incisor. The most commonly missing teeth are third molars, second premolars (Fig. 18-6), and maxillary lateral and mandibular central incisors. The absence may be either unilateral or bilateral. Children who have developmentally missing teeth tend to have more than one tooth absent and more than one morphologic group (incisors, premolars, and molars) involved.

**Radiographic Features**

Missing teeth are recognized by identifying and counting the existing teeth. However, it must be kept in mind that the development of teeth may vary markedly among patients. Eruption of some teeth may be developmentally delayed by a number of years after the established time (especially mandibular second bicuspids) and others may show evidence of development as late as a year after the contralateral tooth.

**Differential Diagnosis**

A tooth may be considered to be developmentally missing when it cannot be discerned clinically or radiographically and no history exists of its extraction. Anodontia or oligodontia frequently occurs in patients with ectodermal dysplasia (Fig. 18-7). This inherited disorder results in the absence of at least two ectodermally derived structures, such as sweat glands, hair, skin, nails, and teeth. The severity of the condition is variable and may result in multiple missing teeth and malformed teeth, often having a conical shape or a notable decrease in size. Many other syndromes and conditions may interfere with the development of teeth.

**Management**

Missing teeth, abnormal occlusion, or altered facial appearance may cause some patients psychologic distress. If the extent of hypodontia is mild, the associated changes may likewise be slight and manageable by orthodontics. In more severe cases restorative, implant, and prosthetic procedures can be undertaken.

**SIZE OF TEETH**

A positive correlation exists between tooth size (mesiodistal diameter x buccolingual diameter) and body height. Males also have larger primary and
permanent teeth than females. Beyond these normal variations, however, individuals may occasionally develop unusually large or small teeth.

**MACRODONTIA**

**Definition**
In macrodontia the teeth are larger than normal. When the teeth are of normal size but occur in smaller-than-normal jaws, the condition is relative macrodontia. Macrodontia may rarely affect the entire dentition, but more commonly it involves a group of teeth, individual contralateral teeth, or a single tooth (Fig. 18-8). The presence of a hemangioma (either intraosseous or in the soft tissues) can result in an increase in the size and advanced development of adjacent teeth. Also localized true macrodontia can occur in hemihypertrophy of the face. True generalized macrodontia may also occur with pituitary gigantism. The cause of macrodontia is unknown. The large size of the teeth is apparent on clinical examination. Associated crowding, malocclusion, or impaction may occur.

**Fig. 18-7** A and B, Examples of ectodermal dysplasia displaying various degrees of missing and malformed teeth.

**Fig. 18-8** Macrodontia is a condition that results in enlarged teeth. A, The macrodont molar shows an increased mesiodistal dimension. B, The macrodont central incisor shows enlargement of both its mesiodistal and longitudinal dimension. (A, Courtesy Dr. B. Gratt, Los Angeles, CA.)
Radiographic Features
Radiographs reveal the increased size of both erupted and unerupted macrodont teeth. The crowding may cause impaction of other teeth. The shape of the tooth is usually normal, but some cases may exhibit a mildly distorted morphology.

Differential Diagnosis
The macrodont may resemble gemination or fusion. When fusion occurs, there is a missing tooth. In gemination all the teeth may be present and often evidence exists of a division or cleft of the coronal or root segment of the tooth. However, the differentiation of these three conditions may not influence the treatment provided.

Management
In most cases macrodontia does not require treatment. Orthodontic treatment may be necessary, however, in the case of malocclusion.

MICRODONTIA
Definition
In microdontia the involved teeth are smaller than normal. As with macrodontia, microdontia may involve all the teeth or be limited to a single tooth or group of teeth. Relative microdontia can also occur. In this condition normal-sized teeth develop in an individual with large jaws. Generalized microdontia is extremely rare, although it does occur in some patients with pituitary dwarfism. Supernumerary teeth are frequently microdont. Also, the lateral incisors and third molars, which often are developmentally missing, may be small.

Clinical Features
The involved teeth are noticeably small and may have altered morphology. Microdont molars may have altered shape—from five to four cusps in mandibular molars and from four to three in upper molars (Fig. 18-9). Microdont lateral incisors are also smaller and peg-shaped (Fig. 18-10).

Radiographic Features
The shape of these small teeth may be normal, but more frequently they are malformed.

Differential Diagnosis
The recognition of small teeth indicates the diagnosis. The number and distribution of microdons may also suggest consideration of syndromes (e.g., congenital heart disease, progeria).

Management
Restorative or prosthetic treatment may be considered to create a more normal-appearing tooth, especially when considering esthetic concerns in the anterior dentition.
ERUPTION OF TEETH

TRANSPOSITION

Definition
Transposition is the condition in which two teeth have exchanged positions.

Clinical Features
The most frequently transposed teeth are the permanent canine and first premolar (more often than the lateral incisor). Second premolars infrequently lie between first and second molars. The transposition of central and lateral incisors is rare. Transposition in the primary dentition has not been reported. It can occur with hypodontia, supernumerary teeth, or the persistence of a deciduous predecessor.

Radiographic Features
Radiographs reveal transposition when the teeth are not in their usual sequence in the dental arch (Fig. 18-11).

Differential Diagnosis
Transposed teeth are usually easily recognized.

Management
Transposed teeth are frequently altered prosthetically to improve function and esthetics.

ALTERED MORPHOLOGY OF TEETH

FUSION

Synonym
Synodontia

Definition
Fusion of teeth results from the combining of adjacent tooth germs, resulting in union of the developing teeth. Some authors believe that fusion results when two tooth germs develop so close together that as they grow, they contact and fuse before calcification. Others contend that a physical force or pressure generated during development causes contact of adjacent tooth buds. The genetic basis for the anomaly is probably autosomal dominant with reduced penetrance. Males and females experience fusion in equal numbers, and the incidence is higher in Asians and Native Americans.

Clinical Features
Fusion usually causes a reduced number of teeth in the arch. It occurs in deciduous and permanent dentitions, although it is more common between deciduous teeth. When a deciduous canine and lateral incisor fuses, the corresponding permanent lateral incisor may be absent. Fusion is more common in anterior teeth of both the permanent and deciduous dentition (Fig. 18-12). Fusion may be total or partial depending on the stage of odontogenesis and the proximity of the developing teeth. The result can vary from a single tooth of about normal size to a tooth of nearly twice the normal size. A bifid crown may exist, or two recognizable teeth may be joined by dentin or enamel. The crowns of fused teeth usually appear to be large and single, or an incisocervical groove of varying depth or a bifid crown occurs.

Radiographic Features
Radiographs disclose the unusual shape or size of the entire tooth. The true nature and extent of the union are frequently more evident on the radiograph than can be determined by clinical examination. Fused teeth may show an unusual configuration of the pulp chamber, root canal, or crown.

FIG. 18-11 A cropped panoramic image demonstrating bilateral transposition of the maxillary canines and first bicuspids.

FIG. 18-12 Fusion of the central and lateral incisors in both the primary and the permanent dentition. Note the reduction in number of teeth and the increased width of the fused tooth mass.
CHAPTER 18  DENTAL ANOMALIES

Differential Diagnosis
The differential diagnosis for fused teeth includes gemination and macrodontia. Fusion may be differentiated from gemination by the reduced number of teeth, except in an unusual case, in which the fusion is between a supernumerary tooth and a normal tooth. The differentiation is usually academic because little difference exists in the treatment provided.

Management
The management of a case of fusion depends on which teeth are involved, the degree of fusion, and the morphologic result. If the affected teeth are deciduous, they may be retained as they are. If the clinician contemplates extraction, it is important first to determine whether the succedaneous teeth are present. In the case of fused secondary teeth, the fused crowns may be reshaped with a restoration that mimics two independent crowns. The morphology of fused teeth requires radiographic evaluation before they are reshaped. Endodontic therapy may be necessary and perhaps may be difficult or impossible if the root canals are of unusual shape. In some cases it is most prudent to leave the teeth as they are.

CONCRESCENCE

Definition
Concrecence occurs when the roots of two or more teeth are united by cementum. It may involve either primary or secondary teeth. Although its cause is unknown, many authorities suspect that space restriction during development, local trauma, excessive occlusal force, or local infection after development may play an important role. If the condition occurs during development, it is called true concrecence; if later, it is acquired concrecence.

Clinical Features
Maxillary molars are the teeth most frequently involved, especially a third molar and a supernumerary tooth. Involved teeth may fail to erupt or may erupt incompletely. The sexes are equally affected.

Radiographic Features
A radiographic examination may not always distinguish between concrecence and teeth that are in close contact or are simply superimposed (Fig. 18-13). When the condition is suspected on a radiograph and extraction of one of the teeth is being considered, additional

FIG. 18-13  A, Concrecence occurs when two teeth are joined by a mass of cementum. B, Extraction of one tooth may result in the unintended removal of the second because cementum is often not well visualized radiographically. (Courtesy Dr. R. Klenholz, Dallas, Texas.)
projections at different angles may be obtained to better delineate the condition.

**Differential Diagnosis**

It is usually impossible to determine radiographically with certainty whether the teeth whose root images are superimposed are actually joined. Is the periodontal membrane space continuous around each root? If the roots are joined, it may not be possible to tell whether the union is by cementum or by dentin (fusion).

**Management**

Concrescence affects treatment only when the decision is made to remove one or both of the involved teeth. This condition complicates the extraction. The clinician should warn the patient that an effort to remove one might result in the unintended and simultaneous removal of the other.

**Gemination**

**Synonym**

Twinning

**Definition**

Gemination is a rare anomaly that arises when the tooth bud of a single tooth attempts to divide. The result may be an invagination of the crown, with partial division, or in rare cases complete division throughout the crown and root, producing identical structures. Complete gemination results in a normal tooth plus a supernumerary tooth in the arch. Its cause is unknown, but some evidence exists that it is familial.

**Clinical Features**

Gemination more frequently affects the primary teeth, but it may occur in both dentitions, usually in the incisor region. It can be detected clinically after the anomalous tooth erupts. The occurrence in males and females is about equal. The enamel or dentin of geminated teeth may be hypoplastic or hypocalcified.

**Radiographic Features**

Radiographs reveal the altered shape of the hard tissue and pulp chamber of the germinated tooth. Radiopaque enamel outlines the clefts in the crowns and invaginations and thus accentuates them. The pulp chamber is usually single and enlarged and may be partially divided (Fig. 18-14). In the rare case of premolar gemination, the tooth image suggests a molar with an enlarged crown and two roots.

**Differential Diagnosis**

The differential diagnosis of gemination includes fusion. If the malformed tooth is counted as one, individuals with gemination have a normal tooth count, whereas those with fusion are seen to be missing a tooth.

**Gemination**

**Synonym**

Twining

**Definition**

Gemination is a rare anomaly that arises when the tooth bud of a single tooth attempts to divide. The result may be an invagination of the crown, with partial division, or in rare cases complete division throughout the crown and root, producing identical structures. Complete gemination results in a normal tooth plus a supernumerary tooth in the arch. Its cause is unknown, but some evidence exists that it is familial.

**Management**

A geminated tooth in the anterior region may compromise arch esthetics. Areas of hypoplasia and invagination lines or areas of coronal separation represent caries-susceptible sites that may in time result in pulpal infection. Affected teeth can cause malocclusion and lead to periodontal disease. Consequently the affected tooth may be removed (especially if it is deciduous), the crown(s) may be restored or reshaped, or the tooth may

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**Figure 18-14**

A, Gemination of a mandibular lateral incisor showing bifurcation of the crown and the pulp chamber. B, Almost complete gemination of a deciduous lateral incisor.
be left untreated and periodically examined to preclude the development of complications. Before treatment is initiated on primary teeth, the status of the succedaneous teeth and configuration of their root canals should be determined radiographically.

TAURODONTISM

Definition
Taurodont teeth have longitudinally enlarged pulp chambers. The crown is of normal shape and size, but the body is elongated and the roots are short. The pulp chamber extends from a normal position in the crown throughout the length of the extended body, leading to an increased distance between the cementoenamel junction and the furcation. Taurodontism may occur in either the permanent or primary dentition (or both). Although some evidence of the trait can be seen in any tooth, it is usually fully expressed in the molars and less often in the premolars. Single or multiple teeth may show taurodont features, unilaterally or bilaterally and in any combination of teeth or quadrants.

Clinical Features
Because the body and roots of taurodont teeth lie below the alveolar margin, the distinguishing features of these teeth are not recognizable clinically.

Radiographic Features
The distinctive morphology of taurodont teeth is quite apparent on radiographs. The peculiar feature is an extension of the rectangular pulp chamber into the elongated body of the tooth (Fig. 18-15). The shortened roots and root canals are a function of the long body and normal length of the tooth. The size of the crown is normal.

FIG. 18-15 Taurodontia, revealed as an enlarged pulp chamber, in all permanent first molars (A), in a primary first molar (B), and in a permanent molar (C).
Differential Diagnosis
The image of the taurodont tooth is characteristic and easily recognized radiographically. The developing molar may appear similar; however, the identification of the wide apical foramina and incompletely formed roots helps in the differential diagnosis. Taurodontism has been reported with greater frequency in trisomy 21 syndrome.

Radiographic Features
Radiographs provide the best means of detecting a radicular dilaceration. The condition occurs most often in permanent maxillary premolars. One or more teeth may be affected. If the roots bend mesially or distally, the condition is clearly apparent on a periapical radiograph (Fig. 18-17). When the roots are bent buccally (labially) or lingually, the central ray passes approximately parallel with the deflected portion of the root. The dilacerated portion then appears at the apical end of the unaltered root as a rounded opaque area with a dark shadow in its central region caused by the apical foramen and root canal (an appearance like a bull’s-eye). The periodontal ligament (PDL) space around this dilacerated portion may be seen as a radiolucent halo (Fig. 18-18), and the radiopacity of this segment of root is greater than the rest of the root. In some cases, especially in the maxilla, the geometry of the projections may preclude the recognition of a dilaceration.

Management
Taurodont teeth do not require treatment.

DILACERATION
Definition
Dilaceration is a disturbance in tooth formation that produces a sharp bend or curve in the tooth. One of the oldest concepts is that it is probably the result of mechanical trauma to the calcified portion of a partially formed tooth. Although this may occur, especially to the maxillary incisors, most cases are likely to be true developmental anomalies. The angular distortion may occur anywhere in the crown or root.

Clinical Features
Most cases of radicular dilaceration are not recognized clinically. If the dilaceration is so pronounced that the tooth does not erupt, the only clinical indication of the defect is a missing tooth. If the defect is in the crown of an erupted tooth, it may be readily recognized as an angular distortion (Fig. 18-16).

DENS IN DENTE
Synonyms
Dens invaginatus, dilated odontome, and gestaant odontome

Definition
Dens in dente results from an infolding of the outer surface into the interior of a tooth. This can occur in either the crown or the root during tooth development and may involve the pulp chamber or root canal, resulting in deformity of either the crown or the root. These anomalies are seen most often in tooth crowns. Coronal invaginations usually originate from an anomalous infolding of the enamel organ into the dental papilla. In a mature tooth the result is a fold of hard tissue within the tooth characterized by enamel lining the fold (Fig. 18-19). The most extreme form of this anomaly is referred to as the dilated odontome.
CHAPTER 18  DENTAL ANOMALIES

341

FIG. 18-17  A, Dilaceration of the root of a maxillary lateral incisor. B, Dilaceration of the root of a mandibular third molar.

FIG. 18-18  Dilacerated root. The apical portion of the root of this third molar is bent buccally or lingually into the plane of the central ray. Note the halo in the apical region, produced by the PDL space giving a "bull's-eye" appearance (arrow).

When dens in dente involves a root (radicular dens invaginatus), it appears to be the result of an invagination of Hertwig's epithelial root sheath. This results in an accentuation of the normal longitudinal root groove. In contrast to the coronal type (lined with enamel), the radicular-type defect is lined with cementum. If the invagination retracts and is cut off, it leaves a longitudinal structure of cementum, bone, and remnants of PDL within the pulp canal. The structure often extends for most of the root length. In other cases the

FIG. 18-19  Dens in dente is characterized by an infolding of enamel into the tooth. This sectioned canine with a dens in dente shows enamel (arrows) folded into the tooth's interior.
root sheath may bud off a saddle invagination that produces a circumscribed cementum defect in the root. Mandibular first premolars and second molars are especially prone to develop the radicular variety of this invagination anomaly.

Little difference in the frequency of occurrence exists among white and Asian people. If all grades of expression of invagination, mild to severe, are included, the condition is found in approximately 5% of these two racial groups. The condition appears to be rare in blacks. No sexual predilection exists. Although no specific mode of inheritance seems to fit all the data, a high degree of inheritability seems to exist.

**Clinical Features**

Coronal dens in dente may be identified clinically as a pit at the incisal edge or the cingulum. The pit in the cingulum may be particularly broad and deep, especially when these features occur in the lateral incisor. Often the lingual marginal ridges or cingula are prominent. In most cases, however, the dens in dente is not large, and crown morphology appears normal. Dens in dente occurs most frequently in the permanent maxillary lateral incisors, followed by (in decreasing frequency) the maxillary central incisors, premolars, and canines and less often in the posterior teeth. Invagination is rare in the crowns of mandibular teeth and in deciduous teeth. It occurs symmetrically in about half the cases. Concomitant involvement of the central and lateral incisors may occur.

The clinical importance of dens invaginatus results from the risk of pulpal disease. Although enamel lines the coronal defect, it is frequently thin, often of poor quality, and even missing in some areas. Furthermore, the cavity is usually separated from the pulp chamber by a relatively thin wall and opens into the oral environment through a narrow constriction. The pit is often difficult to keep clean, and consequently, it offers conditions favorable for the development of caries. Such carious lesions are difficult to detect clinically and will rapidly involve the pulp. In addition, sometimes fine canals extend between the invagination and the pulp chamber, resulting in pulpal disease even in the absence of caries.

**Radiographic Features**

Most cases of dens in dente are discovered radiographically. The infolding of the enamel lining is more radiopaque than the surrounding tooth structure and can easily be identified (Fig. 18-20). Less frequently the radicular invaginations appear as poorly defined, slightly radiolucent structures running longitudinally within the root. The defects, especially the coronal variety, may vary in size and shape from small and superficial to large and deep. If a coronal invagination is extensive, the crown is almost invariably malformed; when the crown is malformed, the apical foramen is usually wide (Fig. 18-21). A frequent cause of an open apical foramen is the cessation of root development that occurs as a result of death of the pulpal tissue. In the most severe form (dilated odontome) the tooth is severely deformed, having a circular or oval shape with a radiolucent interior (Fig. 18-22). Dens in dente can be identified in the radiographic image even before the tooth erupts.

**FIG. 18-20** Dens in dente is seen radiographically as a radiopaque infolding of enamel into the tooth’s pulp chamber. A-C, Various degrees of involvement of the maxillary lateral incisors.
CHAPTER 18 DENTAL ANOMALIES

FIG. 18-21 A and B, Examples of severe malformations of dens in dente. These usually result in necrosis of the pulp, open apices, and periapical inflammatory lesions.

Differential Diagnosis
The appearance and usual occurrence in incisors are so characteristic that, once recognized, little probability exists that the anomaly will be confused with another condition.

Management
Although it is important to evaluate every case individually, the placement of a prophylactic restoration in the defect is typically the treatment of choice and should ensure a normal life span for the tooth. Failure of early identification and hence treatment may result in premature tooth loss or the requirement for root canal therapy.

DENS EVAGINATUS

Synonym
Leong’s premolar

Definition
In contrast to the dens in dente, dens evaginatus is the result of an outfolding of the enamel organ. The result is an enamel-covered tubercle, usually in or near the middle of the occlusal surface of a premolar or occasionally a molar (Fig. 18-23). Canines are rarely affected. The frequency of occurrence of dens evaginatus is highest in Asians and Native Americans.

Clinical Features
Clinically, dens evaginatus appears as a tubercle of enamel on the occlusal surface of the affected tooth. A polyplike protuberance exists in the central groove or lingual ridge of a buccal cusp. Dens evaginatus may occur bilaterally and usually in the mandible. The tubercle often has a dentin core, and a very slender pulp horn frequently extends into the evagination. After the tubercle is worn down by the opposing teeth, it appears as a small circular facet with a small black pit in the center (Fig. 18-24, B). Wear, fracture, or indiscriminate surgical removal of this tubercle may precipitate a pulpal infection. In rare cases a microscopic direct communication may occur between the pulp and the oral cavity through this tubercle. In these instances the pulp may become infected shortly after eruption.

Radiographic Features
The radiographic image shows an extension of a dentin tubercle on the occlusal surface unless the tubercle is
already worn down. The dentin core is usually covered with opaque enamel. A fine pulp horn may extend into the tubercle, but this may not be visible radiographically. If the tubercle has been worn to the point of pulpal exposure or has fractured, pulpal necrosis may result (see Fig. 18-24). This is indicated by an open apical foramen and periapical radiolucency.

**Differential Diagnosis**

The clinical and radiographic appearance may be characteristic or may be difficult to visualize if the tubercle has been worn down to the occlusal surface.

**Management**

If the tubercle causes any occlusal interference or shows evidence of marked abrasion, it should probably be removed under aseptic conditions and the pulp capped, if necessary. Such a precaution may preclude pulpal exposure and infection as the result of accidental fracture or advanced abrasion.

**AMELOGENESIS IMPERFECTA**

**Definition**

Amelogenesis imperfecta is a developmental disturbance that interferes with normal enamel formation. It leads to marked changes in the enamel of all or nearly all the teeth in both dentitions. Most forms are autosomal dominant or recessive, but two types are X-linked. Amelogenesis imperfecta is not related to any time or period of enamel development or any clinically demonstrable alteration (disease or dietary abnormality) in
other tissues. The enamel may lack the normal prismatic structure, being laminated throughout its thickness or at the periphery. As a result these teeth are more resistant to decay. The dentin and root form are usually normal. Eruption of the affected teeth is often delayed, and a tendency for impaction exists. Although at least 14 variants of the condition have been described, four general types have characteristic clinical or radiographic appearances: a hypoplastic type, a hypomaturation type, a hypocalcified type, and a hypomaturation-hypocalcified type associated with taurodontism.

**Clinical Features**

**Hypoplasia.** As a result of some defect in ameloblasts, the enamel of the affected teeth fails to develop to its normal thickness. It is so thin that the dentin shows through and imparts a yellowish-brown color to the tooth. In the various hypoplastic forms the enamel may be pitted, rough, or smooth and glossy. The crowns of the teeth may not have the usual contour of enamel but rather have a roughly square shape. The reduced enamel thickness also causes the teeth to be undersized, with lack of contact between adjacent teeth (Fig. 18-25). The occlusal surfaces of the posterior teeth are relatively flat with low cusps. This is a result of the attrition of cusp tips that were initially low and not fully formed. An anterior open bite may be noted.

**Hypomaturation.** In the hypomaturation form of amelogenesis imperfecta, the enamel has a normal thickness but a mottled appearance. It is softer than normal (density comparable to dentin) and may crack away from the crown. Its color may range from clear to cloudy white, yellow, or brown. In one form of hypomaturation the teeth appear to be snow-capped (with white opaque enamel).

**Hypocalcification.** Hypocalcification of teeth is more common than the hypoplastic variety of amelogenesis imperfecta. The crowns of the teeth are normal in size and shape when they erupt because the enamel is of regular thickness (Fig. 18-26). However, because the enamel is poorly mineralized (less dense than dentin), it starts to fracture away shortly after it comes into function. This creates clinically recognizable defects. The soft enamel abrades rapidly and the softer dentin also wears down rapidly, resulting in a grossly worn tooth, sometimes to the level of the gingiva. An explorer point under pressure can penetrate the soft enamel; yet caries in these worn teeth is unusual. The hypocalcified enamel has increased permeability and becomes stained and darkened. The teeth of a young person with generalized hypomineralization of the enamel are frequently dark brown from food stains.

**Hypomaturation/hypocalcification.** This classification indicates a combination of hypomaturation and hypocalcification that involves both the permanent and deciduous dentition. If the dominant defect is hypomaturation, then the term hypomaturation-hypocalcification is used. The enamel is usually mottled and discolored (yellow and brown). The enamel has the same radiopacity as the dentin. When the dominant defect is hypocalcification, the term hypocalcification-hypomaturation is used. The appearance of the teeth is similar, but the enamel is thin.