

Common Dental Disorders

Caries



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*Caries is tooth decay, commonly called **cavities**. The symptoms—tender, painful teeth—appear late. Diagnosis is based on inspection, probing of the enamel surface with a fine metal instrument, and dental x-rays. Treatment involves removing affected tooth structure and restoring it with various materials. **Fluoride**, diligent dental hygiene, sealants, and proper diet can prevent virtually all caries.*

Etiology

Caries is caused by acids produced by bacteria in dental plaque. Plaque is, at first, a soft, thin film of bacteria, **mucin**, dead **epithelial cells**, and food debris

that develops on the tooth surface within about 24 h after the tooth is cleaned. *Mutans streptococci* is a group of related bacteria that grow in plaque and can cause caries. Some strains are more **cariogenic** than others. Eventually (commonly, after 72 h), soft plaque mineralizes, mainly with **Ca**, **phosphate**, and other minerals, becoming calculus (hard plaque or tartar), which cannot easily be removed with a toothbrush.

Risk factors: There are several risk factors for caries:

- Dental defects
- High-acid and/or low-fluoride environment
- Reduced salivary flow

Many teeth have open **enamel pits**, **fissures**, and **grooves**, which may extend from the surface to the dentin. These defects may be wide enough to harbor bacteria but too narrow to clean effectively. They predispose teeth to caries. Large amounts of sugar in the diet provide nutrients for plaque-forming bacteria.

A tooth surface is more susceptible to caries when it is poorly **calcified**, has low fluoride exposure, and/or is in an **acidic environment**. Typically, decalcification begins when the pH at the tooth falls below 5.5 (eg, when **lactic acid**-producing bacteria colonize the area or when people drink cola beverages, which contain **phosphoric acid**).

Rampant caries in deciduous teeth suggests prolonged contact with infant formula, milk, or juice, typically when an infant goes to bed with a bottle (baby or nursing bottle caries). Thus, bedtime bottles should contain only water.

The elderly often take drugs that reduce salivary flow, predisposing to caries. The elderly also have a higher incidence of root caries because of **gingival recession**, exposure of root surfaces, and **declining manual dexterity**.

Caries (on Examination)



Complications: Untreated caries leads to tooth destruction, infections, and the need for extractions and replacement prostheses. Premature loss of **deciduous teeth** may shift the **adjacent teeth**, hindering eruption of their permanent successors.

Symptoms and Signs

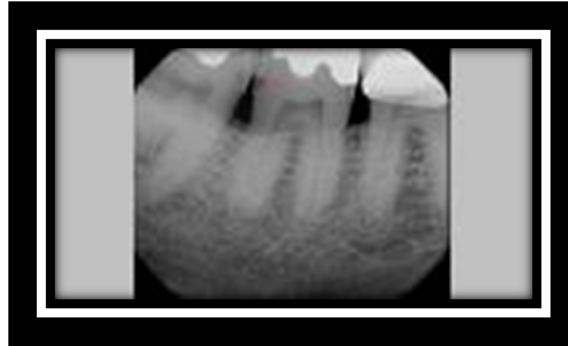
Caries initially involves only the enamel and causes no symptoms. Caries that invades the dentin causes pain, first when hot, cold, or sweet foods or beverages contact the involved tooth, and later with chewing or percussion. Pain can be intense and persistent when the pulp is severely involved.

Diagnosis

- Direct inspection
- Sometimes use of x-rays or special testing instruments

Routine, frequent (every 6 to 12 mo) clinical evaluation identifies early caries at a time when minimal intervention prevents its progression. A thin probe, sometimes special dyes, and **transillumination** by **fiberoptic lights** are used, frequently supplemented by new devices that detect caries by changes in electrical conductivity or laser reflectivity. However, x-rays are still important for detecting caries, determining the depth of involvement, and identifying caries under existing restorations.

Caries (on X-ray)



Treatment

- Restorative therapy
- Sometimes a root canal and crown

Incipient caries (which is confined to the enamel) should be **remineralized** through improved home care (brushing and flossing), cleanings, prescriptions for high-fluoride toothpastes, and **multiple fluoride applications** at the dental office.

The primary treatment of caries that has entered dentin is removal by drilling, followed by filling of the resultant defect. For very deep **cavities**, a temporary filling may be left in place 6 to 10 wk in the hope that a tooth will deposit **reparative dentin**, preventing exposure of the **pulp**, which necessitates root canal treatment.

Fillings for **occlusal surfaces** of **posterior teeth**, which bear the brunt of **mastication**, must be composed of strong materials. The most common material has been **silver amalgam**, which combines silver, mercury, copper, tin, and, occasionally, zinc, palladium, or indium. Amalgam is inexpensive and lasts an average of 14 yr. However, if oral hygiene is good and if amalgam was placed using a rubber dam for isolation from saliva, many amalgam fillings last > 40 yr. Although concern has been raised about mercury poisoning, the number of amalgam fillings a person has bears no relationship to blood mercury levels. Replacing amalgam is not recommended because it is expensive, damages tooth structure, and actually increases patient exposure to mercury.

Composite resins, which have a more acceptable appearance, have long been used in anterior teeth, where aesthetics are primary and the forces of chewing are minimal. Some patients request them in posterior teeth as well, and they are becoming common there. However, composite resins under

high occlusal stress generally last less than half as long as amalgam and tend to develop recurrent decay because the composite resin shrinks when it hardens and expands and contracts with heat and cold more than the tooth or other filling materials. The current generation of composites also closely resembles enamel but does not appear to have the same incidence of recurrent caries as earlier materials and may also last longer. However, although long-term results with these newer amalgam substitutes appear good, data equivalent in numbers and duration to those with amalgam are not yet available.

If decay leaves too little dentin to hold a restoration, a dentist replaces the missing **dentin** with **cement**, **amalgam**, **composite**, or other materials. Sometimes a post must be inserted into one or more roots to support a gold, silver, or composite core, which replaces the **coronal dentin**. This procedure necessitates a root canal filling, in which an opening is made in the tooth and the pulp is removed. The root canal system is thoroughly debrided, shaped, and then filled with **gutta-percha**. The outer tooth surfaces (what would have been the enamel) are then reduced so that an artificial crown, usually made of gold, porcelain, or both, can be placed. Crowns for anterior teeth consist of, or are covered with, porcelain.

Prevention

- Regular brushing and flossing
- Fluoride in water, toothpaste, or both
- Regular professional cleanings
- Rarely **chlorhexidine** rinses and topical fluoride applications

For most people, caries is preventable. Cavities first form on permanent teeth in the early teens to late 20s. Caries-prone people typically have low exposure to fluoride and a relatively **cariogenic microflora** acquired from their mothers and through social contact. Maintaining good oral hygiene and minimizing sugar intake are especially important.

Removal of plaque at least every 24 h, usually by brushing and flossing, helps prevent dental caries. The gingival third of the tooth is the most important area to clean but is the area most often neglected. Electric and electronic toothbrushes are excellent, but a manual soft toothbrush, used for an average of 3 to 4 min, suffices. Using excess toothpaste, particularly an abrasive type, may **erode** the teeth. Dental floss is placed between each of

the teeth, curved against the side of each tooth, and moved up and down 3 times, going just beneath the gingival margin. Flosses that are very thin or coated with wax or **polytetraethylene** can be used for exceptionally tight contacts between teeth or rough filling margins.



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Teeth with fluoride incorporated into their enamel are more resistant to acidic decalcification and more readily recalcify when pH increases. If drinking water is not adequately **fluoridated**, oral fluoride supplements are recommended for children from shortly after birth through age 8 yr and for pregnant women beginning at 3 mo **gestation** (when teeth are forming in the fetus). The dose must be selected according to the amount of fluoride present in the drinking water, the age of the child, and whether topical fluoride is being used in toothpaste and/or applied during dental care. The total dose should not be so high as to cause **dental fluorosis**. Fluoridated toothpaste should also be used by people of all ages.

Fluoridation offers less protection against caries in pits and fissures than against those on smooth surfaces. **Pits** and **fissures** require use of sealants (plastic materials that adhere tightly to the surface of the enamel) to prevent nutrients from reaching bacteria, reducing their growth and acid production.

If these measures do not decrease cavity formation, more intensive therapy is aimed at changing the flora. After cavities are treated, pits and fissures, which can harbor *M. streptococci*, are sealed. This treatment is followed by a 0.12% chlorhexidine mouth rinse used for 60 sec bid for 2 wk, which may reduce the cariogenic bacteria in plaque and allow repopulation with less cariogenic strains of *M. streptococci*. To encourage this repopulation, xylitol in the form of hard candy or chewing gum is used for 5 min tid. Additionally, topical fluoride may be applied by a dentist or used at night in a custom-made fluoride carrier.

For pregnant women with a history of severe caries, the above regimen may be used before the fetus's teeth erupt. If this is not feasible, the mother can use xylitol, as mentioned above, from the time of the child's birth to the age at which the mother no longer samples the child's food (the hypothesized mode of transfer).

For prevention of caries in deciduous teeth (once they have erupted) in infants, bedtime bottles should contain only water.

Key Points

- Caries is caused by acids produced by bacteria in dental plaque.
- Risk factors include preexisting tooth defects, low saliva flow, an acidic oral environment, and inadequate exposure to fluoride.
- Treatment involves drilling out the decayed area and restoring the defect with amalgam or a composite resin.
- Prevention involves meticulous regular brushing, flossing, and professional cleaning; adequate fluoride must be available in toothpaste and, when not present in drinking water, as oral supplements for children and pregnant women.

Reference: <http://www.merckmanuals.com>