Talking with Patients

Cracked Tooth

Lee W. Boushell, DMD, MS*

WHAT IS IT?

The term "cracked tooth" is generally used to describe the development of a fracture that follows the long axis of a tooth. Shallow cracks (generally referred to as "craze lines") are limited to the outside layer (enamel) of teeth. Excessive biting forces may lead to progression of a surface fracture through the enamel and into the sensitive part of the tooth called dentin. Fractures may grow in depth and width, which allows staining by food molecules and invasion by bacteria of the oral cavity. Fractures that initially do not result in loss of part of the tooth are considered incomplete.

Incomplete fractures that are moving vertically further into the dentin or "propagating" may cause pain during chewing or when the teeth are pressed firmly together (Figure 1). This sensitivity may cease when propagation stops and then return if the fracture begins to extend deeper into the tooth structure. If the fracture progresses into the nerve center ("the pulp") of the tooth, then sensitivity during chewing may increase to a continual pain that will continue until the nerve dies or is removed. The primary reason for the pain is the pulp's response to the presence of the bacteria in the fracture. Crack propagation may also extend into the root system of a tooth.

On occasion, sideways forces on the tooth cause the vertical fracture to propagate in a horizontal fashion (Figure 1) and may eventually result in loss of part of the tooth (e.g., a complete cusp fracture). Loss of tooth structure from dental decay frequently increases tooth susceptibility to fracture formation. Teeth that have therapeutic removal of diseased nerve tissue ("root canal treatment") are at greater risk for fracture of the crown and/or the root of the tooth.

HOW IS IT DIAGNOSED AND TREATED?

Your dentist may identify enamel craze lines during routine examinations. These craze lines do not cause sensitivity and do not require any treatment. In addition to craze lines, cracked teeth that are not sensitive are commonly seen by dental health-care providers. In most cases, the initial development of these cracked teeth resulted in an immediate pain that rapidly dissipated, leaving no further sensitivity for a period of time. Ongoing chewing pressures frequently result in ongoing fracture propagation deeper into the dentin with resultant increased sensitivity. Some cracked teeth are only painful when chewing harder foods or chewing with the teeth in certain positions. Frequently, fractures extend horizontally, and a portion of the tooth (a complete fracture) is obviously lost.

Dentists will use careful visual examination to identify the location of suspected incomplete fractures. Early fractures may require the use of a small light that is placed on the cheek side and tongue side of the tooth. The light passing into the tooth will abruptly stop at the fracture, which enables visual detection. Long-standing fractures frequently are stained and easily seen. Incomplete fractures are rarely detected by standard radiographic analysis. The presence of bacteria in these fractures may result in the development of decay along the fracture. This decay may be visually detected by changes in the color and transparency of the tooth adjacent to the fracture and/or by use of dental radiographs. Selective pressure applied to individual cusps of a suspicious tooth is used to identify if a fracture is active, its relative location,

*Assistant Professor, Department of Operative Dentistry, University of North Carolina at Chapel Hill School of Dentistry, Chapel Hill, NC, USA

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Figure 1. Teeth with incomplete vertical fractures (black arrows) and an incomplete horizontal fracture (white arrow) (courtesy of Dr. John Sturdevant, University of North Carolina–Chapel Hill).

and the region of the tooth that is involved. Fractures that begin to extend onto the root surface may create an isolated gum defect that can be detected during a dental evaluation.

Your dentist has multiple means of restoring lost portions of your tooth. These include fillings placed directly in/on your tooth to create normal shape and function. A more severe complete fracture requires the use of an onlay or crown. A sensitive tooth with an incomplete fracture that has not involved the pulp of the tooth is reinforced with a restoration that covers the biting surface, such as an onlay or crown. The goals of this procedure are to rigidly encircle the tooth structure that contains the fracture, distribute biting pressures over the whole tooth, and limit the potential for further propagation.

Fracture invasion into the pulp necessitates its removal followed by reinforcement of the cracked tooth as described above. An associated risk of the pulp removal procedure is the potential development of a vertical fracture in the root system. Fractures that extend through the pulp and into the root system of the tooth usually cannot be reinforced, and the tooth is extracted.

CONCLUSIONS

A "cracked tooth" has developed a vertical fracture that has the potential to propagate over time. Increased fracture severity may progressively lead to chewing sensitivity, tooth decay, loss of part of a tooth, nerve (pulp) problems, and, in extreme cases, tooth removal. Regular dental care and good communication between you and your dentist will allow early detection of fractures. Early intervention increases the chances of successful reinforcement procedures. Fractures that involve the pulp will require its removal. The nature of the tooth sensitivity and diagnostic findings will help your dentist prescribe appropriate steps indicated to give your cracked tooth the greatest chance of normal use for a lifetime.