Perspectives on the Treatment of Tooth Fractures in Dogs

Written by Nicola Parry

In an open forum discussion, Larry J. Klima, DVM, Denver, Colorado, USA; Gary Goldstein, DVM, University of Minnesota College of Veterinary Medicine, St. Paul, Minnesota, USA; and Donald Beebe, DVM, Englewood, Colorado, USA, described approaches to managing tooth fractures in dogs.

TYPES OF TOOTH FRACTURE

Tooth fractures are common in dogs, and although different types may occur, crown fractures are most frequent. According to Dr. Klima, crown fractures may be classified as follows:

- *Uncomplicated*: involving fracture of the enamel of the tooth with exposure of the underlying dentin, but without pulp exposure.
- *Complicated*: fractures in which the pulp chamber has also become exposed.

Although a fractured tooth is a sensitive tooth, unlike people, dogs are unreliable in showing overt clinical signs of oral pain, and they will often continue to eat, often favoring use of the opposite side of the mouth for chewing. A detailed clinical examination and dental radiography are required when assessing these patients and deciding on the optimal treatment for fractured teeth.

DENTAL MICROANATOMY

Understanding the anatomic relationship between dentin and pulp helps to explain the clinical implications of dental exposure.

Dentin, the layer of material beneath the surface enamel on the tooth's crown, is composed of microscopic dentinal tubules that surround the tooth and project into the pulp cavity, which contains the tooth's nerve and blood vessel supply. These tubules project in a converging fashion, radially arranged such that they are more densely packed as they approach the pulp cavity, and their walls also diverge in this terminal region. This produces an amplification effect because it allows permeating substances, such as bacteria migrating through the tubules, to concentrate into a smaller area where the tubules terminate in the pulp.

Dr. Beebe also explained how a patient's age affects this situation. Because young animals have wider pulp chambers and wider root canals, and therefore increased potential for pulp irritation, dentin exposure due to tooth fracture, or enamel hypoplasia, in a 9-month-old dog will likely have more serious consequences than in a 13-year-old dog. The increased potential for bacterial percolation to the pulp through the exposed tubules ultimately increases the likelihood of tooth sensitivity and discomfort. These bacteria can result in endodontic infection and subsequent abscess, and although this may manifest clinically, it is frequently subclinical and can go undiagnosed. Consequently, the only way to definitively diagnose this is via intraoral radiography.

FRACTURE MANAGEMENT

Intraoral radiography is necessary to evaluate the severity and extent of pathology associated with a fractured tooth. And, although both types of tooth fracture require therapy, treatment differs depending on the type of fracture, radiographic findings, and, in some cases, the duration of the fracture.

Uncomplicated crown fractures that do not enter the pulp cavity may still require treatment because the exposed dentinal tubules allow communication between the pulp cavity and the oral environment, and can therefore result in inflammation or death of the pulp. If there is no periapical pathology and the tooth is still vital, smoothing any rough enamel edges at the fracture site and applying dental sealants may be sufficient. Sealants provide temporary protection until a tooth can seal itself permanently, and this can protect exposed dentinal tubules, preventing contamination and eventual pulp

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involvement. These fractures, however, still require clinical and radiographic monitoring at regular intervals to ensure that the pulp remains alive and healthy.

Dr. Klima noted that his decision to use sealant depends on the age of the patient and the duration of the fracture. If the fracture is acute or occurs in a younger patient, he favors a relatively aggressive approach, performing odontoplasty, smoothing over rough enamel edges, and applying sealant to protect the exposed dentinal tubules. In the case of a 13-year-old dog with a likely chronic fracture, however, he advises radiography to evaluate for pathology but not necessarily the use dental sealant on an old fracture.

On a slightly different note, he also referred to cases involving young dogs with severe enamel hypoplasia resulting from high fever or an illness as a puppy during the period when enamel surfaces were developing. Radiography is also essential in these cases, because if the enamel hypoplasia on the crown of the tooth is this severe, the roots may also be hypoplastic. Consequently, the best treatment option may be extraction rather than restoration.

Complicated crown fractures require more extensive treatment because they do expose the pulp, and Dr. Beebe emphasized that, to maintain the affected tooth, it must be addressed or it will become contaminated. Dental sealants should not be applied in these cases due to the risk of trapping bacteria inside the tooth, resulting in endodontic infection and ultimately death of the tooth. If the tooth is found to be nonvital or infected, the pulp must be removed, via either root canal therapy or extraction.

In cases in which radiographic findings are ambiguous, Dr. Klima advocates taking multiple images of the affected tooth at different angles. Radiography of the contralateral tooth can also be useful for comparison, to help differentiate between radiolucency due to dental pathology and naturally widened periodontal ligaments. In difficult cases in which extensive radiography fails to help establish a diagnosis, future follow-up examination with serial radiography is recommended to evaluate for progression of pathology throughout time. Dr. Goldstein advises a similar approach and emphasizes that follow-up examination may need to be performed throughout a number of years in some cases. This is particularly important when the time of fracture is unknown. In these cases, using dental sealant can increase the risk of sealing in a problem, so it is imperative to monitor them for the development of pathology.

In summary, injuries causing tooth fracture are common in dogs, and whereas extraction of the affected tooth may be required in some cases, many can be treated to preserve the affected tooth. The "watch-and-wait" approach is never an appropriate option, however, particularly for complicated crown fractures, Dr. Beebe concluded.

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