# Dental Emergencies: A Misnomer?

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Most dental conditions found in practice are often chronic in nature – from progressive periodontal disease or tooth resorption to the tooth that has been broken for years. Occasionally a patient is presented with a true dental emergency – often due to some type of trauma – or due to the fact that the owner finally noticed something that had been happening for some time. If trauma has occurred, it is important to quickly assess the extent of injury and the stability of the entire patient. A life-threatening condition should be addressed first. Injuries should be "staged" as to their relative importance, and handled accordingly, until the patient is stabilized. Pain management before, after, and during surgery is an integral part of the treatment plan.

There are occasions where trauma in the oral region can endanger the pet, such as when the airway becomes obstructed, or when hemorrhage cannot be controlled. Once stable, it is then important to regain normal function of the oral cavity as quickly as possible. Getting a patient to eat, drink, and even groom normally is an important part of the healing process.

**Oral trauma**

An event of oral trauma requires complete evaluation, from soft tissue that might require hemorrhage control or reconstruction to osseous damage such as fractures and luxations. Dental trauma may involve individual teeth, or teeth involved in more extensive damage, making decisions for combined care necessary. No matter how the mouth is fixed, it is important to be able to maintain a functional occlusion.

**Soft tissue trauma**

A degloving trauma to the mandible can often be managed with conservative means, gently cleaning and debriding the area before replacing the soft tissue. Areas of necrotic tissue should be debrided, but remain on the conservative side, as blood supply to the oral tissues is usually extensive. The tissue can either be sutured to remaining soft tissue, or stay sutures can be placed around the lower canines to hold the lower lip in place until it is healed.

Tears in the gingiva sometimes require repair as well. The entire site should be thoroughly evaluated, to determine if any underlying pathology exists (fractures, pockets, etc). Often a simple interrupted suture pattern of a small, absorbable material is sufficient. Attempts should be made to preserve as much viable attached gingiva as possible, because this is an important tissue in periodontal defenses.

Damage to the tongue, such as is seen in electric cord trauma from chewing on it, should include conservative debridement of noticeably necrotic regions, and suturing cut areas. Salvage as much of the tongue as possible in the cat, as it plays important roles both in eating and grooming.

**Osseous**

The first step with osseous tissues is to completely determine the extent of damage, as multiple injuries may be present. In cats, the most common osseous oral fracture is that of the mandibular symphysis. Always evaluate the temporomandibular joints (TMJ), because luxation in the presence of another fracture is not uncommon. It is essential to have proper occlusion throughout, as even a small discrepancy in the distal oral cavity can translate into a large variation in the front of the mouth. Any occlusal interference will then disrupt the stability of the fracture repair, further complicating matters. If necessary, a pharyngostomy tube should be placed, so occlusion can be assessed at regular intervals perioperatively.

With mandibular body fractures, the direction of the fracture (especially mid-body) will determine the form of stabilization. A fracture from the ventral surface running caudally to the dorsal surface benefits from muscle placement that helps to keep the fracture reduced (Favorable). Often a single interosseous wire is sufficient here. On the other hand, a fracture line from dorsum to ventrum (caudally) will have muscular forces working to separate the two pieces, so a triangulation of two interosseous wires will be necessary.

Every tooth at a fracture site should be closely examined for viability. If severe periodontal bone loss around a tooth had contributed to the fracture, the tooth might have to be extracted anyway, but most in a fracture line should be preserved to help with stabilization, at least temporarily. With non-invasive methods, the presence of teeth is essential, especially with wire or splint placement. If the injury involved the apical region of a tooth, future endodontics may be necessary if the blood supply was compromised.

One of the most common, and most challenging, areas of mandibular fracture can be the region around the lower first molars. Not only can extensive periodontal bone loss around these teeth significantly compromise the strength of the jaw, but any extraction attempts can potentially result in jaw fracture. With any injury in the area, stablization with interosseous wiring or suturing (use osseopromotive substance to help strengthen bone) can often be supplemented with a splint if surrounding teeth remain.

**Wiring**

The steps of osseous wiring are not too complicated, but basic rules are essential – such as avoiding tooth roots, apical structures and other vital landmarks such as the mandibular canal. In cats, it is more challenging to place wires, so sometimes large gauge suture material (non-absorbable or long-lasting) may be used. Obviously, intraoral radiographs are necessary during these procedures. Either with gingival flaps, or external to the gingiva, holes can be drilled used round burs on a highspeed handpiece, IM pins, or even larger 16 to 18 gauge needles. These methods can provide sufficient stability without having to go to more invasive methods with external fixators, plates or screws in most cases.

Interdental wiring methods are even less invasive, even when placed through the gingiva in between teeth (soft tissue healing occurs after removal). Learning the technique of wiring is the difficult part, but the benefits are great. Splints (acrylic or composite) may also be used as a non-invasive technique, either alone, or in combination with wiring.

- Stout's Multiple Loop – 2-3 teeth on either side of a fracture
    - Static wire – long lead – facial aspect
    - Working wire – lingual/palatal – passed in interdental spaces – loops (IV tubing)
    - Two ends tightened, then tighten loops
    - Acrylic or composite splint to reinforce and cover loops
- Circumferential wiring – mandibular symphysis
    - Midline ventral incision – use large gauge needle to guide wire distal to canines
    - Tighten ends, cover tip with composite

**Splints**

Splints for fixation of fractures in the oral cavity can be a good conservative way to provide stability, with minimal invasiveness or complications. With adequate ventilation, nearly any practice can use the dental acrylics for splints. Once the teeth are flour pumiced and acid-etched, and the surrounding soft tissue protected with petroleum jelly, the jaw fracture should be reduced, and the pieces held into place (with proper occlusion). The "salt and pepper" technique of adding small sequential amounts of acrylic powder and liquid allow for a directed placement of the material, as well to help to minimize the hyperthermic reaction that takes place during the polymerization of acrylics. This type of splint material can be "molded" into desired shapes before the full set-up, and acrylic burs can be used later to trim down excess amounts or to smooth rough edges.

Composite materials, especially temporary ones, are also suited for splint placement. Again, the teeth should be cleaned, flour pumiced and acid etched (rinse well) before the placement of the product and/or a bonding agent below it. Most products require a special dispenser or mixer and are self-cure, allowing sufficient time for shaping of the material. Even without the bonding agent, some of these material will cause staining of the teeth once removed. (Acid-etch and bond lingual/palatal surfaces only; this minimizes staining labially)

**Complicated fractures**

Comminuted or non-union fractures pose special problems, particularly if there is extensive bone loss, either prior to injury (periodontal disease) or after (gunshot, necrosis). With a gap in the bone, it is difficult to place interosseous wiring, and there may be too many missing teeth to provide a framework for a splint. IM pins placed at several sites, distal and mesial, to a fracture site may be joined with tubing filled with acrylic or composite, to form a type of external fixation, but care must be taken to avoid further injury to tooth roots.

With some of the newer osseous implant materials, if some level of stability can be attained, osseous bridging may occur in some cases. Working with a modified splint, tape muzzles, or even bonding opposing canines in a locked position (mouth slightly open to allow the lapping of water or liquid diets), enough stability may be possible in order for these materials to be effective.

With more severe unstable fractures, especially those with poor bone quality and missing teeth, wiring is usually impossible, and the possibility of a partial mandibulectomy may arise. Most animals tolerate such a procedure fairly well, and a commisureplasty may be performed to close the mouth a little further to help keep the jaw from hanging down. Some patients may even tolerate the long term use of a tape muzzle device, with owners that can periodically remove and change the muzzle.

**TMJ injuries**

A good percentage of patients with injuries to the temporomandibular joint (TMJ) come in after trauma such as being hit-by-car, and will present with an open mouth, unable to close it. The condyle can be luxated, either caudally or rostrally (most common), and can often be reduced by using a dowel placed between the upper and lower carnassial teeth with gentle force to press the jaws back together (distal pressure if luxated rostrally, and vice-versa).

Fractures of the condyle will often be painful, and lead to chronic arthritic changes and pain, even if "repaired". Mandibular condylectomy will help to remove the source of pain, and most animals recover well

**Tooth injuries**

While most dental or oral injuries may enjoy the luxury of not requiring immediate attention, a few situations occur where the prognosis of the treatment is enhanced with timely intervention. Other than cases such as osseous fractures that need stabilization as soon as the patient can undergo treatment, cases of tooth avulsion or fractures of immature teeth also benefit from prompt response.

**Tooth avulsion/luxation**

***Complete avulsion***

If the tooth is completely avulsed from the mouth, it is essential to handle it properly to have any chance of it being saved. As soon as the owner reports the incidence, they should be instructed to place the tooth in a container of fresh milk, to keep it moist and to help preserve any periodontal ligament (PDL) cells that may be present on the root. Sterile saline is the preferred storage medium, if it is available. Once the patient and tooth are presented, the tooth should be gently flushed with sterile saline, and the alveolus flushed (dexamethasone) and gently debrided. Care should be taken with these tissues, as you want to keep as many PDL cells viable as possible. With radiographs, evaluate the area for signs of advanced periodontal disease (including chronic osteitis/alveolitis with extrusion of maxillary canines) or osseous changes associated with neoplasia, that may have predisposed the patient to tooth loss. Such teeth are not viable candidates for reimplantation.

With a completely avulsed tooth, it is often easier to do a retrograde endodontic procedure since it is already out, if you have the capability. The tooth is then replanted into the alveolus, any fractures reduced, and the site stabilized. Stabilization of the fracture alveolus or jaw is best done with non-invasive techniques, with interdental wiring and acrylic or composite splints. Soft tissue defects should also be closed at this time. The interdental wiring will actually allow some of the normal minute movements of the tooth within the alveolus – so rigidity is not necessarily the best option.

If an endodontic procedure was not performed initially, standard root canal technique may be performed 2 to 3 weeks after this time. This gives the patient time to recover from the first anesthetic event, and to give supportive tissues time to start to heal, but removes the chance of a periapical abscess from interfering with continued healing. The wire and splint can usually be removed in 4 to 6 weeks, once radiographic and physical signs of healing are present.

***Partial avulsion***

Teeth that retain a portion of their attachment are treated similarly, especially if the apex is completely separated from its bed. If just the coronal portion is avulsed, there may be a chance that the apical blood supply was not disrupted, so replantation and stabilization may be the only treatments necessary. Such teeth must be monitored on a regular basis, to determine if apical blood supply remains viable. If any signs indicate that the pulp was injured or has become non-vital, endodontics must be performed. If any tooth avulsion or even invulsion are due primarily to severe periodontal disease that compromised the periodontal tissues, often extraction is the best treatment option.

**Tooth fracture**

In most cases a fractured tooth has been present for some length of time in a pet, and unless it abscesses, will seldom seem to cause discomfort (though it needs treatment). Occasionally, a tooth with periapical abscess will have an active episode, or suddenly flare up, and these “phoenix abscesses” can be quite painful. At other times, the infection turns into an area of swelling or a draining fistula (suborbital for upper fourth premolars), which may be the first time an owner even realizes there is a problem.

***Acute tooth fracture – mature teeth***

With very astute owners, sometimes the actual fracture event is noticed immediately, and in these cases, there is a window of opportunity to treat the fracture and exposed pulp. With mature teeth, if the pulp is treated within 5 days (see below), with immediate administration of antibiotics and anti-inflammatories (to reduce infection and inflammation potential), sometimes the remaining pulp can be kept alive, and the tooth can remain vital. Because of the narrow canal and subsequently a smaller population of odontoblasts, sometimes even timely therapy is not sufficient to keep the remainder of the pulp viable in a mature tooth. If this is the case, and even as a primary decision in a number of cases, immediately therapy with a standard root canal procedure or even extraction is always an option with mature teeth.

***Acute tooth fracture – immature teeth***

With teeth in patients under 18 months of age, lack of apical closure, thin dentinal walls, and a richer blood/odontoblast supply make options other than standard root canal more likely. In fact, if the fracture happened up to 2 weeks prior to presentation (or if the pulp is exposed iatrogenically during a crown reduction), the chance to treat the tooth with hopes of keeping the pulp alive should be taken. Administration of oral antibiotics and anti-inflammatories is an important step to start until the patient can be seen, though medications that interfere with normal platelet function should be avoided (hemorrhage control is an important step in the therapy).

In these patients, therapy is aimed at removing the coronal portion of the pulp that has been exposed to the environment and bacteria, and placing medicaments so the remaining healthy pulp can form dentin at the exposure site, and continue to help in the tooth’s maturation process, including apical closure (apexigenesis) and continued dentinal wall deposition (odontoblasts).

- Partial pulpectomy – sterile round bur to remove exposed pulp to a depth of at least 3-5 mm
- Hemorrhage control – sterile saline flush, then apply blunt end of a paper point
    - Hemostatic agents – local anesthetic with epinephrine, oxymetazoline

    - Persistent hemorrhage – remove additional pulp
- Place MTA to stimulate the pulp to form a dentinal layer
- Intermediate layer – glass ionomer or flowable composite
- Restorative closure of opening

It is essential to follow these patients closely, in order to assess the continued vitality of the pulp. Intraoral radiographs taken every six months for the first year or two will allow the practitioner to monitor continued maturation of the tooth. Comparison with both the opposite tooth and previous radiographs will show if the canal continues to narrow, and if the apex continues to mature and close, signs that the pulp and odontoblasts are still alive and healthy. A more subjective evaluation would include the appearance of a dentinal bridge, though this may be less distinct. Certainly, there should be no periapical bone loss, which might indicate pulpal death and infection.

**Summary**

It is important to be able to thoroughly assess traumatic injuries to the oral cavity and decide when and how to treat. Often, more conservative methods work well, so be sure not to cause more damage with invasive techniques, preserving teeth and occlusion at all times.