Complications Associated with Tooth Extraction

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Introduction

Tooth extraction is a routine and commonly performed procedure in small animal practice. However, complications may occur and include root fragmentation, iatrogenic mandibular fracture, ocular trauma, and infection.

Fragmented Roots

**Diagnosis:** Fragmented roots may occur secondary to crown or maxillofacial trauma. However, the most common etiology of root fragmentation is iatrogenic during tooth extraction. The diagnosis is made following evaluation of skull or dental radiographs for patients having received trauma. Radiographs may also aid diagnosis of root fragmentation during tooth extraction, however other indicators are obvious during the procedure. Often the clinician will hear an audible crack. Upon inspection of the extracted tooth, an apical root defect will be apparent with the remaining root having a jagged edge. Normally, the root apex has a rounded appearance. Using suction or a cotton applicator to visualize the fragmented root within the alveolus, the remaining root fragment will appear tan in color with a centrally located root canal. Alveoli without root fragments well-up with hemorrhage similar to ink wells. Alveoli with root fragments tend to have less hemorrhage due to the presence of the root.
**Prevention:** Patience during the extraction procedure is the best method to prevent this complication. Extraction forceps should not be used until the tooth is so mobile that it could be removed using finger pressure. Excessive force with the periodontal elevator or premature use of the extraction forceps causes root fragmentation.

**Treatment:** Removal of fragmented roots requires continuation of extraction techniques to remove the root fragment. Periodontal elevators with a narrow working blade surface or special root fragment elevators may be used to facilitate root fragment elevation. If a high-speed handpiece is available, further alveolar bone may be removed with a round or pear-shaped bur to outline the root fragment making elevation easier. Although not recommended, another treatment option includes using the same instrumentation to obliterate the root fragment. The root fragment is harder than the surrounding alveolar bone, therefore tactile perception is necessary to determine when the root fragment has been obliterated. Complications associated with this technique include incomplete removal of the root fragment, relocation of the root fragment into the mandibular canal or nasal cavity, and hemorrhage from trauma to the infraorbital or mandibular alveolar arteries. A radiograph should be taken of the extraction site to confirm removal of root fragments.

The only situation in which root fragments may not be removed is when there is an overriding concern that harm may be inflicted on the patient by pursuing root fragment removal. Root fragments that are not removed are less likely to be associated with chronic infection if the blood supply from the apex is intact and the root fragment is not affected by disease. If a root fragment(s) is not removed, the owner should be informed.
that the extraction was complicated necessitating root fragment retention, and that
diligent monitoring for clinical signs associated with infection is required.

A draining tract or swelling secondary to abscessation are likely clinical signs
related to retention of root fragments. Whether secondary to crown or maxillofacial
trauma, or complications of tooth extraction, root fragments should be removed using
similar techniques as described previously. However, a specific surgical procedure may
be required to access the root fragment(s) similar to surgical procedures for tooth
extraction. All too often “wait and watch” is advised to the owner with regards to
treatment of retained, fragmented roots following trauma. Early treatment is advised
since the exposed root pulp would be expected to be quite painful. Pulpitis is inevitable
secondary to pulp contamination by oral bacterial flora with periapical abscessation a
possible sequelae. If the patient requires general anesthesia for oral fracture or soft tissue
repair, retained roots should be removed during the same anesthetic episode. The
procedure may also be scheduled as a component of a professional teeth cleaning
procedure at an appropriate time following patient stabilization. In summary, a “wait and
watch” treatment plan should only be implemented at the request of the owner and not
recommended by the veterinarian.

**Iatrogenic Mandibular Fracture**

**Diagnosis:** Iatrogenic mandibular fracture may occur when performing exodontics of
any tooth of the mandibular dental arcade, however it is most commonly associated with
the mandibular first molar or the mandibular canine. Fracture associated with extraction
of the mandibular first molar usually occurs when simple exodontic techniques are used
when there is apparent severe periodontal disease with deep periodontal pockets. The clinical signs of periodontal disease may mislead the clinician into believing the tooth is mobile and easy to extract. Even when the destructive periodontitis is severe, the tooth is usually not mobile related to the large root surface area that may continue to have substantial periodontal attachment. Destructive periodontitis may also result in such severe periodontal bone lysis that the ventral mandible is thin and prone to fracture spontaneously or during relatively routine exodontic maneuvers. Finally, older patients requiring extraction of the mandibular first molar may have age-related osteopenia that may also contribute to the incidence of fracture. Similar underlying periodontal or age related changes contribute to iatrogenic fracture of the rostral mandible during mandibular canine extraction.

**Prevention:** Pre-procedure intraoral or standard radiographs will show bone lysis secondary to periodontal disease. Information gained from radiographic assessment of teeth to be extracted aid the clinician in being able to warn the owner about potential complications during tooth extraction. Controlled force and an emphasis on buccal or lingual luxation of tooth roots are recommended to prevent iatrogenic fracture. If the clinician is concerned about fracture during normal alimentation following extraction, bone alloplastic materials may be placed in the alveoli prior to wound closure. Pre-procedure radiographs and owner consultation allow easier explanation of the complication of iatrogenic mandibular fracture. Owner compliance and permission for fracture treatment is enhanced when the fracture is perceived as a complication and not a “mistake”. As with other fractures, treatment options for iatrogenic mandibular fracture are limited to repair or salvage techniques. Repair techniques may be associated with
delayed or non-union based on: geriatric patient, osteopenic bone, destructive periodontitis. In fact, fibrous union is not an unusual outcome. Therefore, the clinician must weigh the likelihood of a positive clinical outcome from successful repair as a result of bony union with that from a salvage, resective procedure. It has been documented that canine patients receiving rostral mandibulectomy or rostral hemimandibulectomy for treatment of neoplasia have a good clinical outcome with respect to prehension and mastication of food. These resective surgical procedures may be appropriate for treatment of iatrogenic mandibular fracture based on expectation of a positive outcome, inexpensive cost, low complication rate, and the provision of immediate, definitive therapy for the complication. Alternatively, intraoral splints may be applied to the edentulous mandible to provide stability and eventual bony union.

**Ocular Trauma**

**Diagnosis:** Iatrogenic trauma to ocular structures may occur during extraction of the maxillary fourth premolar, first molar, or second molar. The cause of such trauma is related to the thin alveolar bone and proximity of the ventral floor of the orbit. These structures are adjacent to the caudal maxillary teeth and may be perforated by a pointed instrument such as a periodontal elevator especially in patients with destructive periodontal disease. Panophthalmitis may result from perforation of the globe by the periodontal elevator. If antimicrobial and anti-inflammatory treatment fails, enucleation is an unfortunate result.

**Prevention:** This complication is preventable by using controlled force and a palm grip on the periodontal elevator with fingers placed near the working end or tip of the
instrument. This grip limits accidental penetration of the instrument to the distance between fingers and the tip of the instrument.

**Infection**

**Diagnosis:** Infection of the extraction site following tooth extraction is an unusual complication. The localized osteitis is related to the trauma of the extraction, disruption of blood supply, and bacterial contamination of exposed bone.

**Treatment:** Lavage of the extraction site with 0.12% chlorhexidine followed by primary wound closure as described previously will minimize the incidence of infection. An extraction site, that appears non-healing within 7 days or more following surgery, is abnormal and not necessarily related to infection. The non-healing area should be considered for biopsy to rule-out the possibility of neoplasia such as squamous cell carcinoma.

Localized osteomyelitis may be secondary to severe periodontitis. The affected tooth and periodontium are the focus of the infection with the maxilla or mandible showing clinical signs of osteomyelitis. Tooth extraction of the tooth alone is not sufficient to treat this problem. Additional procedures that are required include elevation of a periodontal flap and removal of necrotic bone with bone rongeurs or a round bur on a high-speed handpiece. The bone may be submitted for bacterial culture however the result will be polymicrobial and difficult to interpret. Thorough debridement of necrotic bone followed by administration of a broad spectrum antimicrobial is usually sufficient treatment.
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