

Veterinary Dental Techniques and Secrets

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Surgical extraction of the upper fourth premolar tooth in cats and dogs.

Dental Anatomy

Teeth that are discolored, fractured or have abnormal shape may require extraction. It is helpful to be familiar with the normal dental anatomy of teeth prior to performing dental extraction. It is especially important to know the normal number of roots for each tooth and that abnormal dental anatomy is frequently encountered.

Dental radiographs can be especially helpful in planning dental extraction. These radiographs help identify teeth that are not normal. Teeth with extra roots are particularly common. The upper third premolar teeth normally have two roots; however, many have three roots in dogs. The extra root is often oriented directly between the two normal roots. Teeth with ankylosed (no periodontal ligament) roots are also common in older dogs with aggressive chewing habits. Some teeth have fused roots. The lower second premolar teeth frequently have two fused roots. Occasionally teeth have roots fused with roots of an adjacent tooth. Anomalous dental anatomy or variations from normal can cause problems with dental extraction. Dilacerated roots may be severely curved or even “hook shaped”. With pre-operative dental radiographs, the operator can prepare for and avoid potential problems associated with dental extraction of these anomalous teeth.

Teeth have crowns normally orientated above the gum line. If the teeth are not fully erupted, they are at risk of periodontal disease development and should be treated proactively by extraction. This problem of incomplete tooth eruption is common in many small breeds of dogs with dental crowding. The pathway for dental eruption is often blocked by dental crowding.

The neck of the tooth is the area within the gingival sulcus between the crown and the roots. In this location, the crown enamel meets the root cementum. For some teeth, there is a slight gap between the cementum and the enamel. In some animals with gingival recession and with this gap between the cementum and enamel; dental sensitivity develops. These teeth may require specific treatment or dental extraction.

The root of the tooth is normally located below the gingival sulcus and the alveolar crestal bone. Periodontal disease is an infectious, inflammatory and destructive process. The result of chronic periodontal disease can be root exposure, loss of periodontal ligament, development of periapical pathology or even fatal pulpitis (non-vital tooth). Dental radiographs are needed to determine the severity of periodontal destruction. The root is normally covered by cementum. Cementum contains nerves and can be a source of sensitivity when roots are exposed. The tooth root is the last area of the tooth to develop. The age of the animal will dramatically impact the degree of tooth root development and can affect the dental extraction procedure. Poorly developed roots tend to be fragile and can easily fracture during aggressive dental elevation. Dilacerated, or abnormally shaped roots can cause dental extraction complications.

The periodontium consists of the gingiva, periodontal ligament, alveolar bone and the root cementum. The tooth root attaches to the alveolar bone by the periodontal ligament (PDL). The PDL is orientated 360 degrees around the tooth root. If the periodontal ligament is partially or totally lost (chronic inflammation or infection); the tooth is ankylosed. The root cementum and the alveolar bone fuse (ankylosis). Ankylosis creates great difficulty with dental extraction. Gingival fibers also support tooth root attachment. It is important to sever these gingival attachments prior to dental extraction.

The upper fourth premolar tooth normally has three distinct roots in cats and dogs. The orientation of the three roots provides stability for the tooth and sometimes causes challenges during dental extractions. It is helpful to be familiar with the normal shape and orientation of these roots. The orientation of these roots varies between species. For more information read about the cephalic index in; Kressin, DJ. *The Oral Examination of Cats and Dogs*: Compendium; 31(2), 72-85 February 2009.



The distal (caudal) root has the greatest surface area of the three roots. The apex (root tip) of the distal root tends to be broad. The distal root diverges distal toward the adjacent first molar tooth. The two mesial (rostral or front) roots are approximately the same length as the distal root; however, the surface area of these roots is substantially less than the distal root. The mesial buccal root is oriented close to the adjacent third premolar tooth. The mesial buccal root apex is frequently curved in a medial, mesial or distal direction. The palatal root diverges from the mesial buccal root in a medial direction and is orientated very close to the respiratory tract. The root apex of the palatal root is frequently curved in a mesial or distal direction. The palatal root is sometimes submerged under the palatal mucosa especially in small brachycephalic dog breeds. The operator must create access to submerged palatal crowns using palatal mucosal flaps.

Dental Extraction

Dental extraction can be “awfully simple or simply awful”. Teeth that are “loose” from extensive periodontal disease are often relatively “simple” to extract because the periodontium (tooth support) has been destroyed. Teeth that appear loose may be fractured. These teeth can be very challenging to extract. Retrieving fractured root tips requires knowledge of the normal orientation of the roots and is simplified by creating flap exposure for improved visualization. The use of dental radiographs and dental models can help the operator in locating fractured roots. Having a selection of sizes of sharp dental instruments is of tremendous help with dental extractions.

Fundamentally, dental extraction involves severing of the tooth attachments to the alveolar bone and the gingiva. The following is a step by step technique for dental extraction of the upper fourth premolar.

1. Incise the gingiva 360 degrees circumferentially around the tooth.
2. Create a mesial and/or a distal mucogingival flap release through the attached gingiva. Envelop flaps do not have release incisions. They can be used for dental extraction; however they do not allow adequate access for less experienced operators. If an envelop flap is used, it should be extended one tooth mesial and distal to the tooth or teeth to be extracted.
3. Elevate the periosteum with an appropriately sized periosteal elevator.
4. Expose the root furcations (where roots diverge) at the buccal, palatal and interdental aspects of the tooth.
5. Using a #2 or a 701L carbide bur in a high speed hand piece, remove 25 to 50% of the alveolar bone (alveolectomy). A gentle touch is recommended during alveolectomy to avoid root damage. The operator looks for the pink periodontal ligament located between the alveolar bone and the tooth root cementum. The alveolar bone normally appears white and the tooth root off-white or yellow.
6. Section the tooth with an appropriately sized (699L or 701L) bur through each furcation. The furcation is the location where the roots diverge. It is easiest to start cutting the tooth from the apical aspect of the furcation toward the coronal occlusal surface. The furcation between the distal and the mesial buccal roots is simple to find. The furcation between the mesial buccal and the palatal roots is more challenging to find and difficult to section through. It can be very helpful to use a small periosteal elevator to reflect the gingiva in a mesial direction to view this small furcation. Avoid damage to the roots. Root damage will increase risk of root fracture during the extraction.
7. Place an appropriately sized dental elevator in the tooth section between the mesial buccal and the distal root. The elevator should fit firmly into the cut tooth section (curf).
8. Gently “turn and hold” to sever the periodontal ligaments of these roots. Be careful to avoid root fracture. Choose an appropriately sized dental elevator and be patient. Take time for the PDL to separate from the alveolar bone.
9. Look at the palatal root as the mesial buccal root becomes mobile during step 9. The palatal root will not move if the tooth was sectioned correctly. If both the palatal and the mesial buccal roots move; resection the palatal from the mesial buccal root. This will prevent root tip fracture and retention. All root tips must be retrieved!
10. After the PDL is severed around all three roots; each root is individually lifted out of the alveolus. The tooth can be lifted out with a dental extraction forceps or with the operator’s fingers.



11. Curette the alveolus free of debris, irrigate with saline and take a dental radiograph to ensure there are no retained root tips, calculus or bone fragments left in the alveolus.
12. Suture the surgical defect closed using a tension free mucogingival flap. A simple interrupted 4-0 or 5-0 Monocryl suture is recommended. See dental extraction “step by step” technique for additional tips on creating mucogingival flaps at www.mypetsdentist.com . Look up dental extraction link within the “Dog Dental Care” section:
http://www.mypetsdentist.com/site/view/113210_Dentalextraction.pml .

Special Considerations

Feline Teeth

Feline dental extraction is very similar to those procedures in dogs. The feline teeth are fragile. Care must be made to avoid root fracture. Very gentle technique is necessary in removing alveolar bone to avoid damage to the roots. This weakens the roots and increases the likelihood of root tip fracture. See the following link for dental extraction of the upper fourth premolar in cats. This link has photographs:
http://www.mypetsdentist.com/site/view/147901_Dentalextractionofupperfourthpremolarcat.pml .

Brachycephalic Dogs

Brachycephalic dogs have wide short faces. Many of these dogs have dental crowding and rotated teeth. It is especially helpful to have dental radiographs to understand the tooth root orientation. This allows for accurate tooth sectioning and dental elevation of the individual roots. Small brachycephalic dogs often have palatal roots below the palatal mucosa. In these cases, it is helpful to create palatal mucosal flaps for exposure. Care must be made to avoid cutting the major palatine artery, nerve and vein.

Ankylosis

Ankylosed teeth present a particularly difficult problem. The periodontal ligament is partially or totally lost. The root cementum fuses with the alveolar bone. To address ankylosis the operator can use a ¼ round bur on a high speed hand piece to create separation between the alveolar bone and the root cementum. Placement of a small dental elevator into this space allows the application of leverage to gently separate the root from the alveolar bone.

Fractured Roots

Fractured roots must be extracted because they do not resorb! Fractured roots are a source of dental pain and a nidus for infection and inflammation. Sharp instruments are essential for retrieval of fractured root tips. Dr. Kressin recommends Cislak’s dental root tip pick set. This includes three instruments (straight, left and right) with very sharp working ends. The working ends are positioned into the space between the root and the alveolar bone (periodontal ligament space). The instruments are strategically used to elevate the fractured root tip by circumferential placement with gentle technique.

