Decision-Making and Best Techniques for Simple, Multi-Rooted and Complicated Surgical Extractions in Dogs

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Decision making and techniques to simplify dental extractions in dogs have been described. Proper perioperative planning and decision making regarding canine extractions can improve surgical outcome. It is important to properly assess the canine patient prior to the performance of extractions. This includes complete general physical and oral examinations and appropriate preoperative blood work. Once the patient has been properly assessed it is important to select an appropriate anesthetic protocol that will provide the canine dental patient with adequate perioperative pain management.

Oral examination in the awake canine patient is similar to the oral examination in the awake feline patient. Abnormalities detected are discussed with the owner with the stipulation that additional abnormalities may be detected in the anesthetized patient. Oral examination in the anesthetized canine patient begins with a thorough oral examination including evaluation for missing or supernumerary teeth, malformed teeth, proper occlusion, periodontal probing and exploration of the teeth with a dental explorer to detect pulpal exposure, worn teeth and dental caries. Abnormalities are noted on the canine dental chart.

Dental radiography is an important tool in the decision making process in canine dental patients. Dental radiography can help determine the most appropriate treatment modality in canine teeth affected with periodontal disease, endodontic disease, dental caries and other lesions. A dental radiograph taken prior to performing a difficult extraction will provide the veterinarian with important information regarding the tooth. Radiographic evaluation of the tooth will determine if other treatment options may be possible so that the owner can be offered alternatives to extraction. In cases of severe periodontal or endodontic disease extraction may be the best treatment option for the patient. Dental radiographs prior to extraction will also reveal structural abnormalities that might be present in the tooth or surrounding bone. These structural abnormalities include: severe periradicular bone loss secondary to periodontal or endodontic disease, supernumerary roots, abnormal root angulation including convergent roots and excessive curvature of the apical portion of the root, ankylosis and hypercementosis. Knowledge of these structural abnormalities prior to initiation of the extraction provides important information regarding the most appropriate technique for the extraction and will help reduce the incidence of complications.

A high-speed handpiece with fiberoptics is extremely helpful when performing surgical extractions in dogs. The fiberoptic handpiece provides a light source directly on the surgical site. Burs utilized frequently include a variety of round burs for the removal of buccal bone and tapered fissure burs for sectioning multi-rooted teeth. Essential hand instrumentation for performing canine extractions have been previously described.1-5 Hand instrumentation specifically designed for canine extractions is available through numerous veterinary supply companies. Instruments for canine extractions may be packaged together in a canine extraction pack and steam sterilized prior to each use. Instrumentation in canine extraction packs include: scalpel handle upon which a #15 blade can be placed prior to surgery, a periosteal elevator, a soft tissue retractor, a variety of dental elevators and luxators, extraction forceps, needle holders, Adson tissue forceps, suture scissors and an iris scissors for cutting soft tissue. A small root forceps is also helpful for reaching down into an alveolus and obtaining a firm grasp on a loose root tip. It is imperative to routinely sharpen dental instruments to insure optimal functionality.

The dental formula in the adult dog is: 2 (I 3/3, C1/1, P4/4, M2/3) = 42. The incisors and canine teeth all have one root. The 1st premolars and the lower 3rd molars have one root. The upper 2nd and 3rd premolars and the lower 2nd,3rd 4th premolars and 1st and 2nd molars have two roots and the upper 4th premolar and 1st and 2nd molars have 3 roots. Knowledge of the location of the furcation of the teeth will permit accurate sectioning of teeth during surgical extractions.

There are several techniques for performing extractions in the dog. These techniques include a simple, multi-rooted and surgical extraction.

The incisors, the maxillary and mandibular 1st premolars and the mandibular 3rd molar are generally small single rooted teeth in the dog and can be usually be removed using simple or closed extraction techniques. Simple or closed extraction techniques have been previously described. The procedure is initiated by cutting the gingival attachment around the whole circumference of the tooth using a No. 11 scalpel blade on a handle or a sharp luxator. A luxator that matches the curvature of the tooth is selected and is placed into the gingival sulcus at a slight angle to the tooth and pressed into the periodontal ligament space and worked around the entire circumference of the tooth using gentle apical pressure. The operator may now elect to continue the extraction using a dental elevator or continue using a luxator. A dental elevator may be used once adequate space has been created for the thicker tipped instrument. An appropriate sized elevator is selected, placed in the periodontal ligament space and worked around the tooth with a gentle rotational pressure held at each point for 10-15 seconds to help break down the periodontal ligament. Once the tooth becomes loose it can be removed digitally or gently grasped with a dental extraction forceps placed as far apically on the tooth as possible and with a gentle rotational movement of the forceps in the long axis of the tooth, the tooth may be rotated and removed from the alveolus.

Extraction of multi-rooted teeth in dogs begins by cutting the gingival attachment to the tooth with either a No. 11 or 15 scalpel blade on a handle or an appropriately sized sharp luxator. The furcation(s) of the tooth are located using visual inspection of the gingiva and alveolar crest. Furcations may be located by observing where the gingiva and alveolar crestal bone raises slightly coronally. Removal of a small amount of bone in this area with a round bur will help in visualizing the furcation. Once the furcation is located, the tooth is sectioned by placing a tapered fissure bur (#701 or #701L) at the furcation and sectioning the tooth through the crown. One cut is made in 2 rooted teeth and two cuts are made in 3 rooted teeth to divide the tooth into multiple single units. A V-shaped sectioning of the tooth at the furcation will help provide better access to each root. To confirm that the tooth has been successfully sectioned, a dental elevator is placed between the segments and gently rotated. If the segments move slightly apart then the sectioning is complete; if the segments do not move following slight leverage between the cusp segments then the sectioning is likely to be incomplete and addition burring is necessary to complete the sectioning. Once the sectioning is complete the individual roots are extracted independently as previously described for simple extractions.

A complicated or surgical extraction technique is generally reserved for teeth that are difficult to extract because of their large root structure including the canine teeth, mandibular 1st molars and the maxillary 4th premolars. A surgical extraction may also be performed when teeth are ankylosed or when attempting to retrieve a broken root tip. The teeth most commonly requiring surgical extractions include the canine teeth and the carnassial teeth.

Surgical extraction of the maxillary canine tooth is initiated by making divergent incisions mesial and distal to the canine tooth and creating a mucoperiosteal flap. The buccal alveolar bone is removed as needed with a round bur to easily extract the tooth with luxators and dental elevators. Care should be taken to avoid creating an oronasal fistula during the extraction. The periosteal layer of the flap is incised apically to relieve tension on the flap prior to closure. There are two approaches for the surgical extraction of the mandibular canine teeth including the labial and lingual approach. The labial approach utilizes a mucoperiosteal flap located on the labial aspect of the tooth while a lingual approach utilizes a lingually located flap. Equal amounts of alveolar bone are present buccally and labially so there is no advantage of one technique over the other with regard to bone removal. The mental artery, vein and nerve exit through the mental foramen located near the labial aspect of the apex of this tooth. A lingual approach avoids potential damage to these structures.

When performing a mucoperiosteal flap for the surgical extraction of the maxillary 4th premolar several structures should be carefully avoided. When making the mesial (rostral) portion of the incision the infraorbital artery, vein and nerve should be avoided as they exit the infraorbital canal immediately rostral to the periapical bone of the mesiobuccal root of the maxillary 4th premolar. These structures can be avoided by digitally retracting them dorsally and not extending this incision too far apically. When making the distal (caudal) part of the incision, the parotid and zygomatic salivary duct papillae should be visualized and avoided. After raising the mucoperiosteal flap the furcations are located using a round bur. The tooth is then sectioned through the furcation between the mesiobuccal and distal roots with a #701L tapered fissure bur from the furcation through the crown. Alveolar bone over the distal root is removed as needed to remove the distal root. A V-shaped segment can be removed from the cusp overlying the furcation. Alternatively some operators prefer to amputate part of the remaining portion of the crown. The bur is placed in the furcation perpendicular to the tooth at the base of the palatal wall of the mesiobuccal cusp to section the mesiobuccal and palatal roots. The alveolar bone over the mesiobuccal root is removed as needed to remove the mesiobuccal root. The interradicular bone between the mesiobuccal and palatal roots can be removed as needed to expose the palatal root. When extracting the palatal root it is important to direct the luxator in a slightly palatal direction to follow the palatal direction of the apex of this root. The extraction site is débrided, flushed and closed in a routine manner.

Surgical extraction of the mandibular 1st molar is initiated with a mucoperiosteal flap with two divergent releasing incisions on the mesial and distal buccal aspect of the tooth. The mucoperiosteal flap is raised and the furcation is located and sectioned. The distal and mesial edges of the cusps of the tooth may be removed to provide straight access to the periodontal ligament space. This is particularly helpful in teeth that are crowded. Buccal alveolar bone is removed as needed to extract the segments. Rough edges of the alveolar bone are reduced with a large round bur, the extraction site is débrided and flushed with sterile saline. The periosteal layer of the flap is released and the flap is closed in a simple interrupted manner.

Surgical techniques for extraction of fractured root tips has been described.6 When a tooth root fractures it should be determined if the root must be retrieved and in most cases root fragments should be completely removed. Roots of endodontically and periodontally diseased teeth must be removed. However, teeth undergoing severe bony replacement/resorption may be best treated conservatively. When extracting fractured tooth roots a mucoperiosteal flap is raised and some of the buccal alveolar bone over the retained root is removed. When attempting to localize the fractured root the operator should examine the extracted coronal segment to mentally determine the anatomic features of the residual root structure. In addition, the operator should look for a white, hard, non-bleeding structure with a central pulpal red or black spot. Dental radiographs can be extremely helpful in locating fractured root tips. Other techniques that have been described include using the flat end of a cylindrical diamond bur on a high-speed handpiece to flatten the coronal aspect of the fractured root and a small area of the surrounding bone until the root is clearly visible in cross-section. A small

round bur (# 1/2) is used to create a “gutter” or space around the root to place an elevator into the expanded PDL space. It is important to locate the periodontal ligament space while elevating a root because failure to locate this space often results in inappropriate placement of the dental elevator or luxator either on the alveolar bone or tooth. Elevation on the alveolar bone or tooth is ineffective and until the dental elevator or luxator is directed into the periodontal ligament space removal of the root will not proceed efficiently. A dental elevator is placed in the space and gently rotated and held for 10-20 seconds around the entire circumference of the root. The periodontal ligament space will fill with a small amount of blood and can be observed as a thin red line located between the alveolar bone and the root. The dental elevator or luxator should be directed into this space to permit more effective elevation and efficient extraction of the root until it becomes loose and is easily extracted. The surgical site is débrided, flushed and closed routinely.

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