EXTRACTION TECHNIQUES

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Step 1: **OBTAIN CONSENT**

NEVER extract teeth without owner consent (preferably written), no matter how bad the problem, or how obvious the decision is. Make sure that you have a valid daytime number (or numbers) for the client and inform them they must be available during surgery hours. Consider loaning pagers to clients for the day, as this author has found this to be a very effective means to contact clients. If the client cannot be reached and prior consent was not obtained, DO NOT PULL THE TOOTH. Document the problem, recover the patient, and reschedule the work. Remember, the tooth can always be extracted later, but it cannot be put back in!

Step 2: **DENTAL RADIOGRAPHS**

Dental radiographs should be exposed on all teeth prior to extraction. Dental radiographs are invaluable resources for the practi coner. Radiographs allow the practitioner to determine the amount of disease present, any root abnormalities or ankylosis. Help with radiographic interpretation is available while the patient is under anesthesia at www.vetdentalrad.com. In addition, the radiographs will serve as evidence for the extraction in the medical record. Radiographs should also be exposed post-extraction to document complete removal of the tooth.

Step 3: **OBTAIN PROPER VISABILITY AND ACCESSABILITY**

The patient should be positioned in such a way as to allow maximum visibility of the area as well as make the surgeon most comfortable. Note that during the extraction procedure the ideal position may change and the patient should be adjusted appropriately. The lighting should be bright and focusable on the surgical field. Suction, air/water syringes, and gauze should be utilized continually to keep the surgical field clear, and mouth gags can be used to hold the mouth in proper position for surgery. Finally, magnification may help the surgeon locate furcations or retained root tips.

Step 4: **PAIN MANAGEMENT**

Extractions are surgical procedures and are moderately to severely painful for the patient. Depending on patient health, a multimodal approach (combination of opioids, NSAIDs, local anesthetics, and dissociative) should be employed, as this provides superior analgesia. Preemptive analgesia is proven to be more effective than post-operative, and it is therefore important to administer the drugs BEFORE the painful procedure.

**SINGLE ROOT EXTRACTIONS**

Step 5: **INCISE THE GINGIVAL ATTACHMENT**
This is accomplished with a scalpel blade (number 11 or 15), elevator, or luxator. The selected instrument is placed into the gingival sulcus with the tip of the blade angled toward the tooth (this will help avoid going outside the bone and creating a defect or cutting through the gingiva). The blade is then advanced apically to the level of the alveolar bone, and the instrument is carefully worked around the entire tooth circumference. This step is very helpful as the gingival attachment contributes approximately 15% of the retentive strength of the periodontal apparatus. More importantly, however, this procedure will keep the gingiva from tearing during the extraction procedure. This is most important with mobile teeth where little elevation is needed, but one edge is still attached. Gingival tearing can cause defects that require closure or can make a planned closure more difficult.

Step 6: ELEVATE THE TOOTH

Elevation is the most dangerous step in the extraction procedure. Remember that you are holding a sharp surgical instrument and working in an area of numerous critical and delicate structures. There have been many reports of eyes that have been gouged and lost by extraction instruments as well as at least one confirmed fatality due to an elevator puncturing a patient’s brain. The index finger is placed near the tip of the instrument to avoid causing iatrogenic trauma in the event of instrument slippage or encountering diseased bone. In addition, the jaw should be gently held with the opposite hand to provide stability and avoid mandibular fracture.

First, select an instrument which matches the curvature and size of the root. There are numerous instruments available including the classic elevator, the luxating elevator, and the winged elevators. Classic elevators and winged elevators are used in an “insert and twist” motion to tear the periodontal ligament, whereas luxators are used in a rocking motion during insertion to fatigue as well as cut the periodontal ligament. Luxators can be GENTLY twisted for elevation, but they are not designed for this and can be easily damaged when used in this manner.

Elevation is initiated by inserting the elevator or luxator firmly yet gently into the periodontal space. The insertion should be performed while keeping the instrument at about a 10 to 20 degree angle toward the tooth, to avoid slippage. Once in the space between the bone and the tooth, the instrument is gently twisted with two-finger pressure. This is not to say that the instrument should be held with two fingers, rather the entire hand should be used to hold the instrument. Twist only with the force that you could generate when holding with two fingers. Hold the position for 10-30 seconds to fatigue and tear the periodontal ligament.

It is important to note that the periodontal ligament is very effective in resisting intense, short forces. It is only by the exertion of prolonged force (i.e. 10-30 seconds) that the ligament will become weakened. Heavy stresses only serve to put pressure on the alveolar bone and tooth which can result in the fracture of one of these structures, so it is important not to use too much force.

After holding for 10 to 30 seconds, reposition the instrument about 1/8 of the way around the tooth and repeat the above step. Continue this procedure 360 degrees around the tooth, each time moving the elevator apically as much as possible. Depending on the level of disease and the size of the tooth, a few to several rotations of the tooth may be necessary.
The key point to successful elevation is PATIENCE. Only by slow, consistent elevation will the root loosen without breaking. It is always easier to extract an intact root than to remove fractured root tips.

Step 7: **EXTRACT THE TOOTH**

Removing the tooth should only be attempted after the tooth is very mobile and loose. This is accomplished by grasping the tooth with the extraction forceps and gently pulling the tooth from the socket. Do NOT apply undue pressure as this may result in root fracture. In many cases, especially with premolars, the roots are round in shape and will respond favorably to gentle twisting and holding of the tooth while applying traction. This should not be performed if there are root abnormalities (significant curves, weakening) seen on the pre-operative radiograph.

It is helpful to think of the extraction forceps as an extension of your fingers. Undue pressure should not be applied. If the tooth does not come out easily, more elevation is necessary. Start elevation again until the tooth is loose enough to be easily removed from the alveolus.

Step 8: **AVELOPLASTY**

This step is performed to remove diseased tissue or bone, as well as rough boney edges that could irritate the gingiva and delay healing. Diseased tissue can be removed by hand with a curette. Bone removal and smoothing is best performed with a carbide, or preferably a coarse diamond bur on a water-cooled high-speed air driven hand-piece. Alternatively, ronguers or bone files may be used if a high-speed dental unit is unavailable. Next, the alveolus should be gently flushed with a 0.12% chlorhexidine solution to decrease bacterial contamination. After the alveolus is cleaned, it may be packed with an osseopromotive substance.

Step 9: **CLOSURE OF THE EXTRACTION SITE**

This is a controversial subject among veterinary dentists, and thus some texts recommend suturing only in large extractions, other authors (including this one) recommend suturing almost all extraction sites. Closure of the extraction site promotes hemostasis and improve post-operative discomfort and aesthetics. It is always indicated in cases of larger teeth (e.g. canines, carnassials), or any time that a gingival flap is created to allow for easier extraction. This is best accomplished with size 3/0 to 5/0 absorbable sutures on a reverse cutting needle. Closure is performed with a simple interrupted pattern with sutures placed 2 to 3 mm apart. It is further recommended to utilize one additional throw over manufacturer’s recommendations to counteract tongue action.

In regards to flap closure, there are several key points associated with successful healing. The first and most important is that there must be no tension on the incision line. If there is any tension on the suture line, it will not heal. Tension can be removed by extending the gingival incision along the arcade (called an envelope flap) or by creating vertical releasing incisions and fenestrating the periosteum. The periosteum is a very thin fibrous tissue which attaches the buccal mucosa to the underlying bone. Since it is fibrotic, it is inflexible and will interfere with the ability to close the defect without tension. The buccal mucosa is very flexible and therefore will stretch to cover large defects. If there is no tension, the flap should stay in position without sutures. If at all possible, the suture line should not be made over a void. If sufficient tissue is present, consider removing some on the attached side to make the
suture line over bone. Always suture from the unattached (flap side) to the attached tissue, because this avoids tearing the flap as the needle dulls. Finally, ensure that all tissue edges have been thoroughly debrided as intact epithelial tissues will not heal.

**EXTRACTION OF MULTI ROOTED TEETH:**
Section all multi-rooted teeth into single rooted pieces. The roots of almost all multi-rooted teeth are divergent and this will cause the root tips to break off if extractions are attempted in one piece. Root fracture can occur even if a tooth is relatively mobile to start with. With mobile teeth, the sectioning step alone often allows for simple extraction.

The best tool for sectioning teeth is a bur on a high-speed air driven hand piece. Besides being the quickest and most efficient tool for the job, it also has air and water coolant that will avoid overheating the tooth. Many different styles of burs are available, however this author prefers a cross-cut taper fissure bur (699 for cats and small dogs, 701 for medium dogs and 702 for large breeds).

The best way to section the teeth is to start at the furcation and work towards the crown of the tooth. This method is used for two major reasons. First, it avoids the possibility of missing the furcation and cutting down into a root, which subsequently weakens the root and increases the risk of root fracture. In addition, this method avoids the possibility of cutting through the tooth and inadvertently damaging the gingiva or alveolar bone.

After the tooth has been properly sectioned, follow the above steps for each single rooted piece. In some cases, the individual tooth pieces can be carefully elevated against each other to gain purchase.

**SURGICAL EXTRACTIONS**
The more difficult extractions are best performed via a surgical approach. This includes canine and carnassial (maxillary fourth premolar and mandibular first molar) teeth, as well as teeth with root malformations or pathology, and finally retained roots. A surgical approach allows the practitioner to remove a small amount of buccal cortical bone, promoting an easier extraction process.

A surgical extraction is initiated by creating a gingival flap. This can be a horizontal flap along the arcade (an envelope flap) or a flap with vertical releasing incisions (a full flap). An envelope flap is created by releasing the gingival attachment with a periosteal elevator along the arcade including one to several teeth on either side of the tooth or teeth to be extracted. The gingiva along the arcade is released to or below the level of the mucogingival junction (MGJ) and the flap is connected by incising the gingiva in the interdental spaces. The advantage to this flap is that the blood supply is not interrupted and there is less suturing.

The more commonly used flap includes one or more vertical releasing incisions. This method allows for a much larger flap to be created, which (if handled properly) will increase the defects which can be covered. The vertical incisions are created at the line angle of the target tooth, or one tooth mesial and distal to the target tooth. The incisions should be made slightly apically divergent (wider at the base than at the gingival margin). Furthermore, it is important that the incisions be created full thickness, in one motion (rather than slow and choppy). A full thickness incision is created by incising all the way to
the bone, and the periosteum is thus kept with the flap. Once created, the entire flap is *gently* reflected with a periosteal elevator. Care must be taken not to tear the flap, especially at the muco-gingival junction.

Following the flap elevation, a small amount of buccal bone should be removed (approximately 1/3 to ½ of the root length depending on the situation) to the depth of the root. This should only be performed on the buccal side. Next, the teeth should be sectioned if multirooted and the teeth then extracted as described above. After the roots are removed the alveolar bone should be smoothed and the defect closed.

Closure is initiated with a procedure called fenestrating the periosteum. The periosteum is a very thin fibrous tissue which attaches the buccal mucosa to the underlying bone. Since the periosteum is fibrotic, it is inflexible and will interfere with the ability to close the defect without tension. The buccal mucosa however, is very flexible and will stretch to cover large defects. Consequently, incising the periosteum takes advantage of this attribute. The fenestration should be performed at the base of the flap, and must be very shallow as the periosteum is very thin. This step requires careful attention, as to not cut through or cut off the entire flap.

After fenestration, the flap should stay in desired position without sutures. If this is not the case, then tension is still present and further release is necessary prior to closure. Once the release is accomplished, the flap is sutured normally.