Tooth extraction is a surgical procedure with serious potential complications and should only be performed by a trained veterinarian. Additionally extraction should only be performed after a diagnosis is made and other treatment options have been presented to the client. The current standard of care is that extractions be performed only with the aid of dental radiography and with proper equipment.

That being said, dental extractions should not be thought of as daunting or intimidating. By following some key guidelines, using proper and well maintained equipment and by using a few surgical skills unique to dentistry, the operator should feel more at ease.

The reasons for performing dental extractions include; complicated fractures (pulp exposure) when root canal therapy is not possible, devitalized teeth, impacted and unerupted teeth, advanced periodontal disease or marked periodontal disease when plaque control cannot be performed, tooth resorption, treatment of certain malocclusions and persistent deciduous teeth.

Extractions are divided into simple extractions and surgical extractions. Simple extractions are performed by simply elevating the tooth from the alveolus. Surgical extractions involved elevating a mucoperiosteal flap, sectioning a tooth into individual roots and some degree of bone removal. Teeth which can be simply extracted are maxillary first and second incisors, mandibular incisors, first premolars, and mandibular third molars. Teeth which should be surgically extracted are maxillary third incisors (except cats and small dogs), canine teeth, second third and fourth premolars, maxillary molars (except the cat), and mandibular first and second molars. Elevation of multi-rooted teeth without sectioning should be avoided as fractured roots are a common complication.

The equipment and instruments used for dental extractions are; a scalpel (15, 15c or 11) to incise the gingiva, a periosteal elevator to raise the mucoperiosteal flap, a water cooled air driven highspeed handpiece (drill) to section the teeth and remove bone, a variety of shapes and sizes of dental elevators and luxators, extraction forceps, small bladed sharp scissors, a needle driver and thumb forceps. Tools such as Dremel tools, “tooth splitters” hacksaws, etc are not recommended and are potentially dangerous to the patient and operator.

Key Concepts

**Short Finger Stop**
The short finger stop is the method of holding a dental elevator or luxator which reduces the risk of iatrogenic damage to the patient. The butt of the handle is palmed and the remainder of the handle is grasped with the thumb, middle, ring and pinky finger. The index finger is held along the shaft on the instrument with the tip of the finger just behind the working edge. This way if the instrument slips, the operators finger serves as a “brake” to prevent damaging the oral tissues, eye, and/or brain with the sharp instrument.
Work Slower to Finish Faster
When one skips steps in the extraction or forcefully elevates the tooth, the result is often fractured root tips, which take more time to retrieve. By working efficiently but carefully, one will achieve optimal surgical time.
- Take care in designing and elevating the mucoperiosteal flap to achieve optimal exposure and easier closure
- Always section multi-rooted teeth no matter how loose the tooth seems
- Remove adequate alveolar bone
- Elevate with minimal force, hold and fatigue the ligament, repeat.

Suture Size, Type and Pattern
Reverse cutting needles are always recommended

Size
- Cats
  - 4-0 or 5-0
  - Smaller radius needles such as the P-3 from Ethicon
- Dogs
  - 3-0 or 4-0
  - Needle radius depends on patient size and surgical site
    - Large needles such as the FS-2 are adequate for large surgical extractions and extractions in larger patients
    - Smaller needles may be of benefit for smaller patients or smaller extraction sites

Type
- Chromic Gut
  - Good for minimally inflamed areas and single extractions
  - Since it is absorbed via phagocytosis, not recommended for inflamed tissue
- Monofilaments such as Monocryl
  - Most commonly used for extractions
  - Completely absorbed in 90-120 days
  - 70-80% reduction in tensile strength in 14 days
  - PDS last up to 180 days and has only lost 14% of tensile strength within 14 days.
- Braided synthetics such as Vicryl
  - Although softer, braided sutures can cause more peri-suture inflammation in the mouth.

Mucoperiosteal flaps
The first step in performing a successful surgical extraction (after proper diagnostics) is the creation of a mucoperiosteal flap. These flaps are made of the free and attached gingiva, alveolar mucosa and periosteum. The three types of incisions involved in a mucoperiosteal flap are a sulcular release, a horizontal release and a vertical release. All flaps involved in routine extraction require a sulcular release. This is simply pushing a scalpel between the free gingiva and tooth into the sulcus to free gingival connective
tissue from the tooth. A horizontal release continues this incision in a mesial or distal direction. A vertical release is nearly perpendicular to the occlusal plane and is extended into the alveolar mucosa in an apical direction. The vertical releases are always made off of a line angle of the tooth. These line angles are at the buccal or facial surface of the tooth and either at the mesial or distal extent. Releases between two roots or along a root are in danger of future dehiscence secondary to masticatory force. If two vertical releases are made, they should be divergent in an apical direction rather than convergent or parallel to aid in closure and to preserve blood supply. The design of the flap should be that to 1) expose enough root for extraction 2) preserve attached gingiva of neighboring teeth and 3) to cover, without tension, the defect created by extraction. When closing these defects, often the attached periosteum prevents apposition without tension. This is addressed by a periosteal releasing incision. Simply, this is a partial thickness incision through the periosteum only which allows the stretch of the mucosa to aid in covering the defect. This can be down with a scalpel or by separating and incision with scissors. One modification (which the presenter prefers for cats) is to use the dull side of the scalpel to “strum” the periosteum and in turn separating it.

Elevation and Luxation
In order to remove the tooth from the alveolus, the periodontal ligament must be severed and the alveolus deformed to allow the tooth to be completely extracted. This is achieved through luxation and elevation. Luxation is the severing of the periodontal ligament with an extremely sharp, thin bladed instrument called a luxator. A luxator is a sharp, thin instrument which is pushed apically to severe the ligament. Elevation with this instrument should be avoided as it can damage the blade.

Elevation is the process of placing slight torque on the tooth in order to stretch the periodontal ligament, slightly deform the alveolus and ultimately mobilize the tooth for extraction.

Simple or closed extractions
Extraction without removal of bone is termed a simple extraction. This can be performed on most incisors, first premolars, maxillary molars (after sectioning the tooth) and mandibular second (after sectioning) and third molars.

This technique involves making a gingival releasing incision and elevating the gingiva from the tooth without damaging neighboring gingiva, followed by luxation and gentle elevation. If the operator is overzealous in elevation, root fracture will occur. The alveolus is debrided. The free gingival margins are then debrided and the edges apposed without tension.

Extraction of the maxillary canine tooth
Extraction of the maxillary canine tooth is always performed surgically. This aids in avoiding perforating the nasal side of the alveolus and dehiscence of the extraction site leading to an oronasal fistula. There are two common flap designs; a single mesial vertical releasing incision or mesial and distal releasing incisions. The presenter prefers a single mesial release and modifying by extending a horizontal release to the first
premolar. The flap is raised so that the apical extent of the juga can be visualized. It is the presenter’s experience that less experienced surgeons may want to begin with a double release until they’ve become more comfortable with surgical extractions. An appropriate sized round or pear bur on a water cooled high speed handpiece is used to remove the buccal cortical bone plate from the root. Enough bone is removed to allow elevation of the tooth without root fracture or iatrogenic trauma. This may be as little as half the buccal bone with an experienced surgeon with sharp elevators and luxators or to just the extent of the apex for the beginning surgeon. If available a sharp luxator is pushed in an apical direction along the mesial and distal aspect of the tooth. An elevator is placed between the root and bone as the mesial extent of the tooth and pressed apically. The elevator is rotated until slight pressure is felt and held for 10 seconds. The elevator is pressed apically further and rotated again. This action is repeated until the tooth is finger loose and can be extracted. If desired, the elevator can be placed between the root and nasal side of the alveolus and rotated to aid in elevation. Always be cognizant of the apex in relation to the nasal cavity as not to perforate the cavity. If the tooth does not move during attempted elevation, more buccal bone is removed. After extraction, the bone is palpated for sharp spicules, which should be removed with a bur or rongeur. The alveolus should be curetted and rinsed. The periosteum is incised to allow closure. The epithelial edges are debrided and the palatal side of the gingiva is elevated off the bone. The flap is closed by first suturing the mesial corner of the flap to the mesial aspect of the palatal mucosa. The distal aspect is closed next and the two ends met with enough sutures to prevent gaping and placement of closed forceps between two sutures. Care should be made to place the sutures over bone. The vertical release(s) are closed next. A post operative radiograph is made to assure complete removal of the tooth.

**Extraction of the mandibular canine tooth**

Extraction of the mandibular canine tooth is always performed surgically. This aids in avoiding mandibular fracture. The presenter prefers a mesial release based on the faciodistal line angle of the third incisor and a distal release angled to incise through the labial frenulum at its most dorsal extent. The flap is raised so that the apical extent of the juga can be visualized. It is important to avoid traumatizing the neurovascular bundle which exits the middle mental foramen. An appropriate sized round or pear bur on a water cooled high speed handpiece is used to remove the buccal cortical bone plate from the root. At least two thirds of the buccal bone is removed. If available a sharp luxator is pushed in an apical direction along the lingual and distal aspect of the tooth. Care should be taken placing an elevator or luxator between the canine tooth and third incisor because a) it may loosen the incisor and b) this area of bone is weaker in cats and brachycephalic dogs and may lead to iatrogenic fracture. An elevator is placed between the root and bone as the linguomesial to lingual extent of the tooth and pressed apically. The elevator is rotated until slight pressure is felt and held for 10 seconds. The elevator is pressed apically further and rotated again. This action is repeated until the tooth is finger loose and can be extracted. The elevator can also be placed along the distal side of the root and rotated to aid in elevation. If the tooth does not move during attempted elevation, more buccal bone is removed. After extraction, the bone is palpated for sharp spicules, which should be removed with a bur or rongeur. The alveolus should be curetted and rinsed. The periosteum is incised to allow closure. The epithelial edges are debrided and the
lingual side of the gingiva is elevated off the bone. The flap is closed by first suturing the mesial corner of the flap to the mesial aspect of the palatal mucosa. The distal aspect is closed next by placing re-apposing the lingual frenulum. This aids in keeping facial symmetry. The two ends met with enough sutures to prevent gaping and placement of closed forceps between two sutures. Care should be made to place the sutures over bone. The vertical releases are closed next. A post operative radiograph is made to assure complete removal of the tooth.

**Extraction of the maxillary fourth premolar**

Extraction of the maxillary fourth premolar is always performed surgically. This aids in avoiding root fracture and allowing for a better surgical closure. There are two common flap designs; a single mesial vertical releasing incision or mesial and distal releasing incisions. It should be noted that a vertical releasing incision between the fourth premolar and first molar may lead to lack of gingival coverage of the molar and potentially root dehiscence. The presenter prefers a single mesial release and modifying by extending a horizontal release midway along the crown of the molar. This allows for better closure at the end of the procedure. The flap is raised so that the apical extent of the jugum of the mesial and distal roots can be visualized. Because the infra-orbital foramen is just rostral to the fourth premolar, care should be taken not to extend the flap into the neurovascular bundle as it exits the formane. An appropriate sized round or pear bur on a water cooled high speed handpiece is used to remove the buccal cortical bone plate to expose the furcation between the mesial and distal roots. The buccal cortical bone plate of the distal root is then removed. Enough bone is removed to allow elevation of the tooth without root fracture or iatrogenic trauma. This may be as little as half the buccal bone with an experienced surgeon with sharp elevators and luxators or to just the extent of the apex for the beginning surgeon. A side cutting bur such as a 701 or 557 is used to separate the mesial and distal roots. An elevator is placed between the mesial and distal portions of the crown and rotated to check for independent movement which indicates complete separation. If crowding between the fourth premolar and first molar are evident, the buccal bulge can be removed from the fourth premolar with a side cutting bur, taking care not to damage the molar. If available a sharp luxator is pushed in an apical direction along the mesial and distal aspect of the distal root. An elevator is placed between the root and bone as the distal extent of the tooth and pressed apically. The elevator is rotated until slight pressure and held for 10 seconds. The elevator is pressed apically further and rotated again. This action is repeated until the tooth is finger loose and can be extracted. If desired, the elevator can be placed between the root and nasal side of the alveolus and rotated to aid in elevation. Additionally, the elevator can be placed between the mesial and distal aspects of the fourth premolar and rotated if the two mesial roots are intact and not resorbing (based on radiographs). If the tooth does not move during attempted elevation, more buccal bone is removed. The buccal bone of the mesial root is removed in a similar fashion. A side cutting bur is used to separate the buccal and palatal root by transecting between the primary cusp and the palatal cusp. An elevator is placed between the buccal and palatal portions of the crown and rotated to check for independent movement which indicates complete separation. A sharp luxator is placed along the mesial and distal aspects of the buccal root, followed by an elevator. The elevator is rotated as before and the root is removed after it is finger loose. A round
or pear shaped bur is used to remove the inter-radicular bone which was between the buccal and palatal roots before the buccal was extracted. This bone should only be removed ~ ½ the length of the root as the maxillary canal may be exposed. A sharp luxator is placed along all aspects of the root and an elevator used to elevate the root in a buccal direction. After extraction, the bone is palpated for sharp spicules, which should be removed with a bur or rongeur. The alveolus should be curetted and rinsed. The periosteum is incised to allow closure. The epithelial edges are debrided and the palatal side of the gingiva is elevated off the bone. The flap is closed by first wrapping the attached gingiva around the mesial aspect of the molar and suturing it to the palatal mucosa at the mesiopalatal line angle of the molar. The mesial aspect is closed next and the two ends met with enough sutures to prevent gaping and placement of closed forceps between two sutures. Care should be made to place the sutures over bone. The vertical release is closed next. A post operative radiograph is made to assure complete removal of the tooth.

**Extraction of the mandibular first molar**
The mandibular molar is extracted in a similar fashion to the fourth premolar. The differences are there is only one mesial root and the buccal cortical bone plate tends to be thicker along this tooth. Additionally as with the mandibular premolars, care needs to be taken not to press against the root in an apical fashion as this may cause the root to be pushed into the mandibular canal. It is extremely crucial with this tooth that pre-operative radiographs be evaluated before extraction because with marked periodontal disease, the risk of pathologic/iatrogenic fracture is high.