

COMPLICATED EXTRACTIONS AND COMPLICATIONS FROM EXTRACTIONS

Judy Rochette, DVM, FAVD, Dipl AVDC

When we enter into an oral surgery situation we're never guaranteed that all is going to proceed as planned. The following are suggestions for difficult situations.

Complicated Extractions

Hooked Root and/or Bulbous Apices

Apical curvature, or a bulbous shape, will impede the root from being drawn from the socket as the diameter of the apex is greater than the smaller diameter of the more coronal socket. Create a flap, with or without a releasing incision, that allows visualization of the distal aspect of the root. Enlarge the diameter of the socket by removal of bone, either on the distal aspect equal to the extent of the hook, or circumferentially equal to the diameter of a bulbous apex. Gentle traction should determine if sufficient bone has been removed to allow the root unimpeded extraction. Too much traction will fracture off the apical portion.

Fractured Root/Retained Root Apices

Regardless of whether the apical portion is mobile or still needs elevation, care must be taken to (re)create a space lateral to the remnant so that forces can be applied laterally to the remnant, and not pressing in an apical direction. Creation of a wedge-shaped void on one side of the root piece, or a "moat" around the whole root portion will allow a root tip pick or THIN elevator into this newly created space to wedge the root remnant to one side, then the other, until movement is achieved. The goal is to create lateral movement, not intrusive movement!

An alternative technique is to remove the buccal bone plate overlying the root remnant. This technique is best used in a single location, over a root that does not extend through the mandibular canal to the ventral cortex, or that does not traverse the buccal-to-lingual thickness of the bone. It is not recommended for retrieving a palatal root of a maxillary three-rooted tooth. In the mandible if the tooth is multi-rooted the buccal and lingual plates may be preserved with bone removal between the roots to expose the remnant.

Root Tips That "Disappear"

Apical remnants that migrate into the nose or a sinus can be very challenging to locate and/or remove atraumatically. Bleeding can impair your view and may move the remnant. Radiographs from several angles are essential to triangulate location. Creation of a secondary access may be needed if the remnant has moved a significant distance from the original socket. Sometimes nasal remnants can be found with endoscopy but not often. Chronic nasal "drip" and/or sinusitis may develop if the remnant cannot be found or retrieved, or the animal may be relatively asymptomatic (pain?).

Apical remnants that enter the mandibular canal can be very painful if they impinge on the mandibular nerve. If left the animal may paw at its face to the point of self-trauma. Infection is possible. These remnants are easier to retrieve than maxillary remnants. Radiographs taken with radiodense markers will help determine the location of the root tip. If the remnant is near the original socket then access can be made by enlarging the socket. If the remnant has moved within the canal, or this is a retrieval being done on another day, make a flap in the overlying alveolar mucosa, then create a bony window through the buccal plate overlying the remnant location. Paint away bone to create the window, but radiograph before perforating completely through the bony plate into the mandibular canal, to ensure your location is correct and window size is adequate. If your window isn't perfect then adjust your area of bone removal and re-radiograph. Once the mandibular canal is accessed the root may immediately be visible and retrieved with very delicate forceps. If the root remnant is not immediately visible and you know that you are in the correct location, the remnant may be located on the lingual side of the artery/vein/nerve bundle. Enlarge your window, use a very delicate forcep or other instrument to move the bundle aside until you can visualize the remnant and pluck it out. Closure of the gingival flap will return periosteum over the bony defect. New bone will fill in the access window in a short period of time.

Interdigitating Roots

When two teeth have roots which interdigitate the challenge is to remove the roots of one tooth without damaging the roots of the second tooth. Remove/extract the crown and other root(s) of the diseased tooth as this should then allow an "end-on" view of the root still to be removed. Delicate elevators, root tip picks or a small bur can create space around the root of interest until it is mobile and can be removed. If space is very limited remove tooth structure from the root you want to extract, while avoiding damaging the roots of the healthy tooth.

Ankylosis

There will be times when you need to remove a tooth that has roots ankylosed to the alveolar bone. Magnification and a small diameter bur will help you recreate space around the root by "moating" through the ankylosed areas.

Crowded Teeth

When extractions are being done to relieve crowding of teeth aim to keep the more important tooth, the tooth most in its anatomically correct position, and extract to optimize the health of the affected, as well as the opposing, arcades. Diseased teeth are removed first. If a collar of attached gingiva doesn't exist and/or can't be created around a tooth it should be removed. Section any multirooted tooth. Remove any loose/exposed roots. Remove smaller roots first to minimize damage to them while trying to extract a more robust adjacent tooth. If necessary remove crown structure from the tooth being removed to make room for your elevator.

Unerupted Teeth

Finding the tooth in 3 planes will require radiographs taken at perpendicular angles to each other. A radiodense cross-hair can be made using two needles placed into the overlying gingiva where the suspected tooth may be. Once the location is radiographically confirmed make a flap in the soft tissues and an access window through the bone. Remove any damaged or compromised teeth that may hinder access and extract the unerupted tooth. Depending on location placing bone implant into the void may be detrimental.

Root Shape and Extra Roots

The mandibular first molar in dogs may have longitudinal grooves on the distal surfaces of its roots that may run the length of each root. The adjacent socket walls project a ridge of bone into the groove and makes elevating along the distal aspect of the tooth difficult, and rotation almost impossible. The projection of bone can be cut through at its base on the socket wall, either with an elevator or small bur.

Occasionally a variation in root number will occur. Radiographs are needed to confirm an extra root, its size and location. The extra roots often cause and/or aggravate periodontal disease. Section the tooth as needed, and ensure that all of the roots are removed.

Complications from Extractions

Jaw Fracture

Mandibular canine and first molar extractions are most often implicated in this problem. If the teeth are being removed for periodontal disease the extraction must be finished as disease around the tooth will inhibit bone healing. Thoroughly curette and flush the socket. Depending on the location, the teeth remaining in the mouth, and the remaining bone in the area, repair is via a composite splint, interfragmentary wiring, or circumferential wiring with a supporting splint on the dorsal aspect of the alveolar ridge, and large buttons on the ventral aspect of the mandible will provide support. Occasionally a muzzle may be needed to support the area until fibrosis occurs.

Orbital or Brain Penetration

Extraction of the maxillary caudal cheek teeth must be done with sharp elevators and care. Dull elevators, excessive intrusive forces, an unskilled operator, periodontal disease, and differences in facial anatomy can lead to an elevator penetrating the eye or brain. This is an emergency. Blindness, glaucoma, uveitis and infection can

lead to enucleation, while seizures, permanent debilitation and death are all possible sequelae to brain penetration. Immediate referral to an ophthalmologist or neurologist is needed.

Orbital penetration when placing a local block can occur, and care should be taken in very small patients and brachycephalics when entering the infraorbital foramen. The acidic pH (3.0) of the agent will cause severe uveitis. Treatment by an ophthalmologist may save vision.

Periorbital deposition of local anesthetic may cause strabismus as the muscles will be flaccid until the local agent wears off. This is almost always self-correcting.

Artery Laceration

Dolicocephalics have a refined head and thinner layers of bone between their teeth, alveolar ridge, nasal cavity, palate, and infraorbital foramen such that one of several major arteries may be in close proximity to the maxillary arcade, or on occasion running between the mesiobuccal and mesiopalatal roots of the fourth premolar. These arteries are only one branch distal to the carotid so bleeding will be very profuse and possibly life threatening. Exophthalmos secondary to retrobulbar blood accumulation may develop with secondary vagal stimulation. Stop all extraction efforts. Pack/seal the socket, the nasal cavity, and place gentle pressure over the eye. If possible place pressure on a proximal source of the artery, or in severe cases you may need to apply pressure to/tie off the carotid. Make sure your endotracheal tube cuff is inflated. Ice packs over the face may also slow bleeding. Monitor the PCV. Watch for new bleeding once the patient recovers from anesthetic and do not leave the patient unattended overnight. While controversial I also recommend avoiding NSAIDs in the immediate post-op period. Do not attempt to remove the remaining tooth fragments until the patient has recovered and the artery has had time to heal.

Oronasal fistula

Dolicocephalic animals seem more susceptible to fistula formation, possibly due to the thin plate of bone between the apex of the maxillary canine tooth and the nasal cavity. Severe periodontal disease in any animal is also a factor. Gentle debridement of the socket at time of extraction, maintenance of a clot within the socket, freshened wound edges and tension free closure are mandatory for success, however should an oronasal fistula form then advanced flap techniques will be needed. For pets that reverse sneeze a support layer may be needed to stop the sucking effect on the flap with its attendant stress on the suture lines. A commercially available bone graft material (eg. from <https://vtsonline.com>), or an auricular cartilage graft, may help support the flap. Single layer flap techniques done well are usually sufficient and double layer closures are less commonly used now.

Lip Trauma

Lip trauma is more easily recognized in our feline patients but dogs that rub or paw at their faces, lick the air or their lips, and/or head shake after extractions should be examined for lip entrapment and/or trauma. In cats extraction of the maxillary canine tooth allows the upper lip to rest more medial than usual. The mandibular canine tooth then makes contact with the upper lip, causing pain and ulceration. In dogs the incisors and cheek teeth can also be involved. Treatment may involve short term numbing agents on the traumatized area until the patient learns to hold its lip out of contact or a scar develops, blunting or extraction of the offending tooth, and analgesics.

Gingival Trauma

This seems to be primarily a feline problem. Extraction of the mandibular molar allows the cusp of the maxillary fourth premolar to contact the gingiva in the mandibular molar area. Proliferative granulation tissue may develop which can strongly resemble squamous cell carcinoma. The longer the contact exists the more proliferative the reactive growth. Treatment involves extracting the maxillary fourth premolar, excision of the masses, and monitoring other areas in the mouth for new contact.

Feline Orofacial Pain Syndrome and Trigeminal Neuralgia

Cats, but usually Burmese, are susceptible to a poorly understood syndrome that involves severe facial pain, often with secondary self-trauma and mutilation (especially of the tongue), that seems to be triggered by tooth

eruption, resorptive lesions, or an extraction(s). The pain is thought to be neuropathic in origin. It is usually unilateral, episodic, and recurring, and with time can become unremitting. Stress reduction, NSAIDS, analgesics which target "wind up" and neurogenic pain (eg. gabapentin) +/- acupuncture are necessary to alleviate the self-trauma, but up to 10% of cats are euthanized due to poor control. Trigeminal neuralgia seems to be reported more often in "small white dogs" with similar triggers to the feline syndrome. Treatment, and response, is also variable.

Subcutaneous Emphysema

Subcutaneous emphysema may develop whenever an air-driven drill is used in proximity to loosely attached gingiva. Crepitus is usually limited to the areas immediately around the mouth but may extend to the top of the head. Dr. Heidi Shafford (Dip. ACVAA) mapped where emphysema can be found if from a tracheal tear vs. an oral introduction and found that the latter appears to not produce mediastinal air, and unlike secondary to a tracheal tear, the emphysema rarely extends to the trunk. The emphysema is usually mild in volume and should never increase, and should resolve on its own within a short period of time. Prevention of future cases may necessitate adjusting air pressure on your handpiece, or a new style of handpiece.

Ranula or Sialocele Formation

A ranula or sialocele can develop secondary to inflammation that occludes a salivary duct, or from direct trauma to a duct. The salivary accumulation usually resolves without treatment once the surgical inflammation recedes, but occasionally a ranula may need to be marsupialized or the salivary gland removed. The sublingual salivary gland(s) is/are most commonly affected but periorbital swelling can occur from zygomatic salivary gland engorgement.