EXTRACTION IN ACTION

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Dr. Mathis's "Cliff Notes" for Dental Extractions

No pet should have a known painful condition unaddressed or overlooked just because they are hiding the symptoms. It is better to be without a tooth than have a painful tooth.

Though cats usually have 30 teeth and dogs usually have 42, only the canines (4) and carnassials (4) are important to save for oral structure and function. One could make an argument for keeping the upper third incisors and upper first molars in dogs as well.

Some think cats just want to lose teeth…. and it's hard to argue that point. – but let's perform extractions correctly so we don't leave behind sources of pain and infection. A study of dogs and cats reported retained tooth roots were present 90% of the time when intraoral radiographs are not taken even though the operator stated the entire tooth was removed in the medical record. This may be part of the reason 55% of the cause of inflammatory rhinitis is due to dental problems.

A tooth with pulp exposure or discoloration needs root canal therapy or extraction. A tooth with a 'chip' fracture (no pulp exposed nor root/gum involvement) often needs a restoration. Yet be aware, 25% of upper 4th premolars with uncomplicated crown fractures are non-vital (endodontically compromised) requiring root canal therapy or extraction.

Every tooth should have one of the following types of flaps performed to extract it unless the tooth fell out during cleaning (FODC):

1) Envelope
2) Triangle
3) Square
4) Split

Some teeth use a square plus a triangle flap (lower canine). Many other flap types exist, but these four work for 99% of extraction needs.

Every extraction site should be cleaned of diseased tissue and bone prior to closing in an appropriate fashion even if it just fell out during cleaning. If it just fell out during cleaning, debride the diseased tissue to reveal healthy tissue or healthy bone. The resulting clot can be stabilized with a cruciate stitch across the alveolus/defect for cases of FODC of the maxillary molars. All flaps must be closed without tension in apposition (except for 109/110/209/210: the ONLY exceptions to this rule).

To have tension free flaps, we must fenestrate the periosteum underlying the *mucosal* part of the tissue. The parts of the 'gums' are

1) gingiva
2) mucosa

The gingival collar is the firm, fibrous part of the gums that surrounds the tooth. Having a snug gingival collar is important to future tooth health of adjacent teeth after oral surgical procedures. The mucosa is further from the tooth past the 'line' (mucogingival junction aka MGJ). Appropriately fenestrated periosteum under oral flaps can allow the mucosa to stretch up to 10 times its original size and not shrink back.

When suturing the mouth, use needle holders without scissors and faster absorbing, dyed, non braided suture. Poliglecaprone25 (PGCL) (e.g. Monocryl, Monomend MT) and Chromic Gut are appropriate choices. Chromic gut expands a little allowing for help in holding knots, absorbs fast, and is soft on the tissues and tongue during the healing phase. For large flaps or areas requiring more holding power, PGCL is a preferred choice. Reverse cutting needles are traditionally used especially when involving the more fibrous gingiva of the dog. In the author's experience, cobra black coated taper needles for cats are preferred, as a taper needle is less likely to tear thin tissues and the taper needle stays sharp longer with the cobra black coating. Also in the author's experience, the taper needles provided with Monomend MT stay sharp as long as the cobra black coated taper needles of other brands, unlike other brand non -coated taper needles. Although there are many suture types preferred for the varied types of advanced oral surgical procedure, the suture selection 95% of the time is one of the following: 4-0 or 5-0 Chromic Gut with a cutting needle or PGCL with a taper needle when needed for areas that have more flap handling.

The standard closure pattern is simple interrupted. Many alternative closures have been successful depending on site preparation, tissue health, suture selected, and knot quality. A recent study of small extraction sites with tension free closure showed that simple interrupted, a short continuous run, and cruciate patterns all may be appropriate for closure. (Pegg 2021) Dr. Loic Legendre also prefers inverted cross mattress suture patterns, which have been shown to work well. Dr. Heidi Lobprise also suggests a subcuticular cruciate pattern that has many similarities.

A suggested order for extractions is:

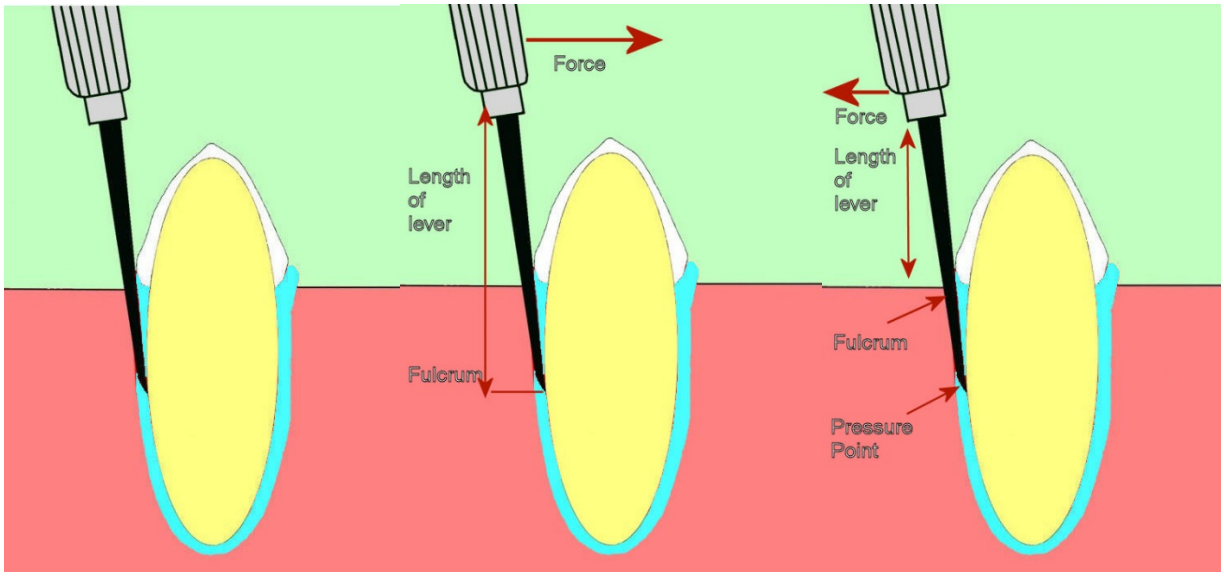
1) Place regional nerve blocks prior to tissue incisions (https://bit.ly/blockvideo)
2) Flap margin incision(s) resecting diseased tissue at the same time
3) Elevate the flap with the periosteal elevator
4) Retract the flap with the zombie on bone (4 handed dentistry can be helpful)
5) Remove as much buccal bone as is necessary to see the furcation or widest part of the tooth with an appropriate sized round bur (generally ½ or 2) Goal is to 'paint' away the marginal buccal bone until you can visualize PDL spaces while leaving the tooth root fully intact without bur marks
6) Create grooves on the sides of each root as if you are taking away the periodontal ligament (PDL) that looks like a grey line with an appropriate sized round bur (generally ¼ or ½) (Round burs are usually placed perpendicular to the bone)
    - The above two steps can be thought of as sanding away three 'PDL' sides of a square peg. Each tooth root is a round peg, but it's easier to visualize with the square peg thought. This means that the fourth side of the peg needs to have the PDL stretched the most.
7) Extend these PDL grooves towards the crown of the tooth and its natural tapers. This resects a diamond shaped part of the upper PM4. Thin the cusps for 'straight access' to the periodontal ligament space with a cross cut taper bur (699 cats or 701 surgical length dogs) (Side of taper bur, *not* the tip, against bone)

- Note the suggested round burs are to remove bone and PDL and the tip is the part that is being used. The suggested taper burs are to cut teeth and the sides are used. Alternatively, 329 pear for cats and 1557 round end taper for dogs can be used as BOTH which can limit the different sizes of burs and types that are needed in one office.

8) Use an appropriately sized luxator to *cut* the periodontal ligament in a vertical fashion holding your finger near the tip to provide a stop in case of 'slippage' (Clear view models and intraoral radiographs can help ensure your luxator direction is *parallel to the long axis of the tooth* root). Do not twist luxators, as the thin metal will fail damaging the instrument and/or the patient.
9) Sing 20 to 30 second elevator music to yourself for each of the 4 root 'sides' as you hold even pressure with a finger stop. Some think of this as isotonic exercise. We are not moving much but are working to fatigue the PDL fibers. Do not expect to advance the luxator at this point of the extraction.
10) Use an appropriately sized <u>elevator</u> to stretch and advance vertically while singing 10 to 20 second elevator music all the while holding pressure with a finger 'stop' in place. (Controlled even pressure to fatigue the PDL, not forcing through)
    - One advantage of a live patient when using elevators and luxators is that as the ligament stretches, blood fills the space helping to facilitate the extraction. Lab specimens do not do this, thus are harder. If you can take it out in a lab, you can take it out often easier on a live patient.
    - Though blood is helpful, it also can obscure your ability to see the PDL for initial elevator/luxator placement. Suction is helpful to resolve this. Recommend MAI's DV-350 suction unit as it's extremely quiet.
11) Scoop (NOT twist) with elevators (no scooping nor twisting with luxators) to reposition to the other sides of the root. Scooping is going around the tooth root. Twisting forces the side of the elevator into the tooth root. This is where elevator shape and size matters.
12) Use of rongeur style extraction forceps to grasp the root even with the long axis of the tooth with *gentle* twisting can help fatigue the PDL fibers. It can also help determine which side of the root may need more attention with elevators/luxators. If the twist is in the wrong plane, or if this is done too soon, or with too much force, this action will only serve to break roots and make extractions more difficult. If you haven't taken out at least 10 teeth in your career, this is not something you should be learning yet.
13) Practice can remove each tooth root in 2 minutes (Do not rush, as this will only create problems adding even more time) (30 seconds x 4 'sides' is 2 minutes!)
    Though this is attainable, you are welcome to laugh, as not every situation is ideal even for board certified veterinary dentists.
14) Curette the alveolus scraping against healthy bone as mentioned above.
15) Smooth the rough edge of the remaining jaw bone with a medium to coarse grit (blue or black stripe) diamond of your choice of shape (ball, football commonly). This called alveoloplasty.
16) Release the flap (cutting periosteal fibers) to ensure tension free closure if it was not released during flap creation. **It is not appropriate to close an extraction site unless you can lay the flap against the opposing side and release all forceps and the tissue still stays in apposition. If the tissue retracts as you let go, it is NOT released enough.

17) Be sure to release the tissue off of the palatal and/or lingual side as well. Not having 1-2 mm of free tissue here is a common cause of inadequate suture throws and your suture pulling through as you tie it. This release also allows for improved alveoloplasty of the palatal/lingual side.
18) Trim to healthy/fresh tissue margins prior to tension free surgical closure.

"Luxating All the Way" An alternative method of extraction
authored by Loïc Legendre, DVM, Dipl. AVDC, Dipl. EVDC, AVDC-ZWD



A B C

Figure 1:
A. Luxator properly wedged into periodontal ligament space.
B. Correct way to apply pressure to the root being extracted; Longer lever allows for more force and the pressure between luxator and root is spread over large area.
C. Incorrect way to apply pressure to the root; shorter lever means smaller force, there are also 2 pressure points. One at the end of the luxator against the tooth and one mid shaft of the luxator against the alveolar bone. These result in both patient and instrument damage.

Apply pressure for 30 seconds.
Repeat on other side of the root. Most of the luxating is done on mesial and distal surfaces of roots.
When root has 1 to 2 mm motion with only digital pressure, use extractor forceps to rotate root and extract.
Curette alveolus, flush. Smooth out bone. Fenestrate periosteum at base of flap to release tension.
Suture flap closed, inverted cross mattress or single interrupted sutures.

Most practitioners benefit from a hybrid technique, and each person will develop their methods for extractions that work for them.

Note that there are two methods of rotating the root with extraction forceps above in the "Luxating All the Way." One is almost the same as #12 above. The other uses the forceps to grasp the widest portion of the root (usually just below the neck) once there is 2mm of movement on a canine or mini canine

(the third incisor) and another instrument is utilized as a fulcrum to rotate the tooth out of the socket in an occlusal direction.

Both types of extraction use luxators to get you started. A 329, 1557, or ¼ surgical length bur can be utilized to begin to get you to find and release the periodontal ligament. The main difference is the lack of buccal bone removal. Winged elevators are helpful to scoop around to find additional PDL sites without compromising the thin bone of the buccal and palatal/lingual aspects.

Key points for all of these methods:

Constant pressure for 30 seconds

No wiggling or twisting

Using rotational force to release further down the root after the coronal aspect has been loosened

Extractions require patience. Rushing will only make things take even longer.

Ergonomics (sitting up, wearing loupes) using instruments that fit your hands and act as an extension of your hand will help. If you are reaching too far to place a finger stop you will result in fatigue and wrist strain.

Sharpen as you go – attend the tool time lecture to learn more.

Resources for more information:
https://tooth.vet/wvc-lectures

New kits with lifetime sharpening, small sizes for broken root tips, and sized to aid in ergonomics will also be linked above.