Veterinaria, Vol. 67, No.2, 2018
Stručni članak (*non peer review*)

Exodontics

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Indications for extractions

The primary indications for dental extractions in cats and dogs are severe periodontitis (PD4), deep crown-root fractures and most root fractures, teeth with structural damage beyond repair, persistent and/or fractured deciduous teeth, supernumerary teeth interfering with occlusion or periodontal health, deciduous teeth causing malocclusion, unerupted teeth, teeth affected by tooth resorption (depending on the type and extent of the resorption), teeth in a fracture line that do not contribute to stability or are interfereing with bone healing, and teeth affected with periodontitis or surrounded by neoplastic tissue before irradiation (Fig. 1, 2).

Teeth should also be extracted if they have crown fracture with pulp exposure, are non-vital or highly suspicious of having pulpitis, were previously endodontically treated but radiographic re-check reveals a failure, have caries, and teeth causing traumatic malocclusion, if other treatment options are deemed inappropriate or not elected by the client. Elective (full-mouth) dental extractions are also still the main treatment step in cats with chronic gingivostomatitis.

Figure 1: Clinical examination of the oral cavity in this dog reveals a draining tract (with a foreign body) above the left maxillary fourth premolar tooth. Left maxillary fourth premolar tooth is fractured and detailed examination with dental radiographs is indicated to evaluate the nature of the fracture and association of the endodontic disease and draining tract. Note also mild gingival recession at the buccal aspect of the left maxillary first molar tooth, which indicates periodontitis, associated with dental deposits

Figure 2a

Figure 2b

Figure 2c

Figure 2d

Figure 2: (a) Clinical examination of the oral cavity in this dog reveals a complicated (pulp is exposed) crown fracture of the right maxillary second incisor tooth. There is a draining tract (as pointing towards it with a dental explorer) at the level of the root tip of the fractured incisor tooth. (b) Occlusal dental radiograph of maxillary incisor teeth reveals a well-defined periapical lesion at the fractured right maxillary second incisor tooth and inflammatory root resorption. (c) The fractured tooth was extracted. (d) Post-operative occlusal dental radiograph of maxillary incisor teeth confirmed complete removal of the tooth.

Contraindications for extractions

In general, teeth should not be removed prior to client‘s approval to do so or if the surgeon has not been appropriatelly trained or lacks proper equipment and instruments. Teeth should not be removed in aggressive animals for disarming purposes as this is a behavior problem. Dental treatment should be deferred in animals with any uncontrolled and/or severe systemic disease (e.g., congestive heart failure, uremia, uncontrolled endocrine diseases, severe coagulopathies or untreated leukemia or lymphoma). Extraction of teeth in previously irradeated jaw possesses a high risk of development of osteoradionecrosis. In addition, teeth surrounded by neoplastic tissue should not be removed at the time of biopsy even if mobile, if surgical treatment is planned. In such cases teeth are removed »en block« with the tumor and other tissues involved.

Basic surgical principles

The basis of the extraction is to severe periodontal ligament that connects the alveolar bone to the root cementum and thus holds the tooth in the alveolus, and is most commonly performed using dental luxators and elevators. Luxators have sharp and relatively flat blades and are used to cut the periodontal ligament. Elevators are used more to loosen and lift roots by elevation, or as a lever. Their tips vary in shape, but the face is usually flat and the back rounded. Several other instruments are employed, including rotary instruments used for sectioning the teeth, and removing and smoothening alveolar bone, in order to execute extraction(s) appropriately. Fine suture material (monofilament, absorbable) with small swaged-on needles (3/8-circle, cutting/ reverse-cutting/tapercut) is generally used in oral surgery, when suturing is indicated.

Tooth extractions should be performed using aseptic technique (basic steps of surgical aseptic technique to reduce the risk of infection include proper preparation of the patient and the surgical personnel, sterilization of all surgical instruments and materials, and maintenance of the surgical room environment). Full-mouth charting, dental radiographs, basic periodontal therapy and regional nerve blocks must be performed prior to any extractions.

Simple vs. surgical extraction

In a simple or closed extraction the periodontal ligament is severed using dental elevators and luxators without the need to section the tooth, perform any flaps or remove bone, which are part of surgical or open extraction. Small, single-rooted teeth are typically extracted with a closed technique, unless they are found to be ankylosed or have root resorption. A surgical approach is recommended for all other multi-rooted teeth and canine teeth, including deciduous teeth. The necessity for a surgical extraction should be recognized early in the extraction procedure, which is largely based on the pre-extraction clinical and radiographic findings, and the knowledge of anatomy.

Local flap is created when performing surgical extraction, which needs to be designed appropriately. Knowledge of the local anatomy is of an utmost importance in order to create an appropriate flap without compromising adjacent vital structures. Several types of flaps can be created, but all should be full-thickness flaps. After reflection of the flap, alveolectomy is performed with a bur (round diamond or carbide bur on a low- or high-speed dental handpiece with water spray). Multi-rooted teeth must then be sectioned through the furcation(s) to separate the roots. Roots are then luxated and/or elevated to enable removal of the root(s). Alveoloplasty is performed to remove any sharp bone edges, preferably with a round diamond bur on a low- or high-speed handpiece with water spray, and the empty alveolus is cleared of any debris or remnants of the pocket epithelium (cases of advanced periodontitis). Before suturing the surgical areas should be gently lavaged with sterile saline - healthy blood clot present in the alveolus before suturing provides an excellent medium for healing. At the last, the flap edges are apposed and sutured without tension.

Surgical principles for dental extractions are the same for dogs and cats, although in cats smaller instruments should be used (Fig. 3). Moreover, tooth resorption that often affects cats, results in a high risk of root fracture, making extraction of resorbing teeth challenging. Coronoectomy is an alternative to extraction in carefully selected cases, with the decision based on dental radiographs.

Complications to extractions

Complications can occur during or after the procedure, and the vast majority can be prevented with good treatment planning and the use of appropriate surgical technique(s).

Root fracture is a common complication (Fig. 4). A retained root tip may cause persistent infection, osteitis, draining tract formation and /or chronic nasal discharge. Therefore a root tip should be carefully inspected following extraction and if in doubt, dental radiograph should be obtained (Fig. 4b). If a retained root fragment

is noted, it should be carefully removed. Blind attempts to remove the root tip are strongly discouraged, as this may result in significant trauma to the surrounding bone and/or dislodgement of the root tip into the mandibular canal, nasal cavity, or maxillary recess. Upon removal of the retained root tips, another dental radiograph should be performed to confirm vacated alveoli (Fig. 4c).

Hemorrhage may be a problem in patients with impaired hemostasis, or if it is severe due to damage of the infraorbital, major palatine or inferior alveolar artery. Other soft tissue injuries are related to flap tear during flap elevation, lip and cheek trauma, or trauma to the salivary ducts with rotary instruments, and puncture wounds due to instrument slippage (including orbital penetration with subsequent ocular and/or brain trauma).

Fracture of the alveolar process may occur with an aggressive technique. This is mostly a minor complication, unless the alveolar fracture extends to a jaw fracture (e.g., during extraction of a mandibular canine tooth or mandibular first molar tooth) (Fig. 5)

Damage to adjacent teeth, nerve damage, and air embolism are also possible, but usually avoided with careful technique(s).

Figure 3a

Figure 3b

Figure 3c

Figure 3d

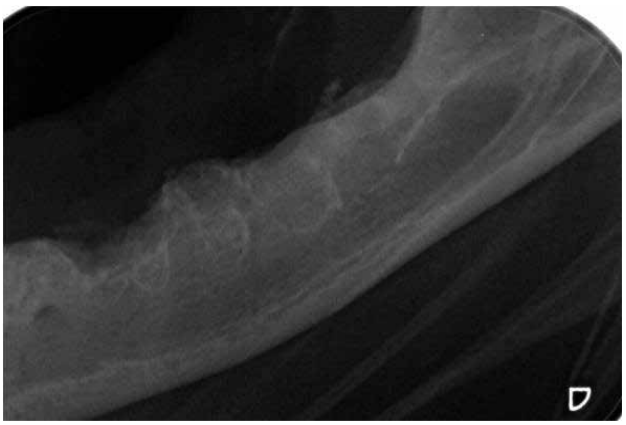

Figure 3e

Figure 3f

Figure 3: Full-mouth extractions were indicated in this cat due to generalized severe periodontitis as determined by detailed oral/dental examination and full-mouth dental radiographs. With the cat under general anaesthesia in dorsal recumbency after an incision, (a) a full-thickness triangular flap was raised with a periosteal elevator from the left mandibular canine to first molar tooth. (b) Premolar and molar teeth were sectioned through furcations and alveolectomy performed. (c) Roots were luxated with a 1-mm luxator and delivered. (d) Alveoloplasty was performed and (e) post-extraction dental radiographs obtained to confirm removal of the roots before (f) closure of the wound was performed in single interrutped pattern with 5-0 monofilament resorbable suture material.

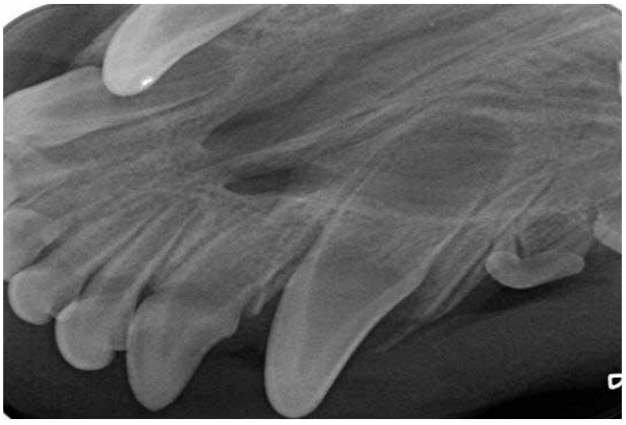

Figure 4a

Figure 4b

Postoperative complications are related to postoperative swelling, pain (aggressive extraction techniques, poor pain management), infection (rare with good surgical technique), delayed wound healing or wound dehiscence (rare with good surgical techniques; possible with some systemic diseases or treatments or neoplasia), occlusal trauma (e.g., maxillary lip entrapment following extraction of maxillary canine teeth), glossopotosis (e.g., following extraction of mandibular canine tooth), oronasal fistula formation (especially if pre-existing), alveolar margin recession and weakening of the mandible.

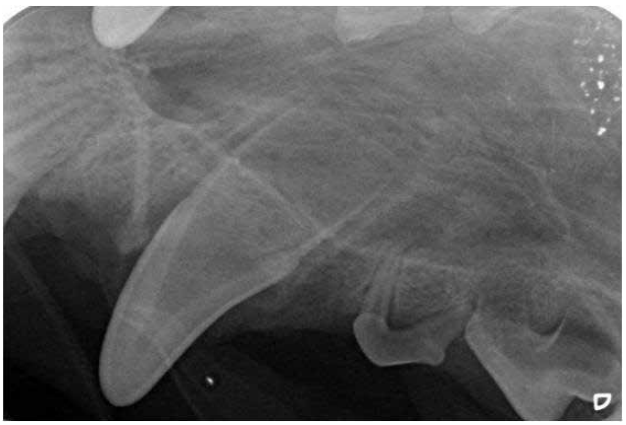

Figure 4c

Figure 4: (a) Dental radiograph (lateral view of the left maxillary canine tooth) in this puppy revelaed root fracture of the deciduous maxillary left canine tooth. The tooth was surgically removed, but a complication with a fracture of the root tip occured, (b) which was confirmed radiographically. Further alveolectomy was performed and fractured root tip gently removed and its' removal confirmed with another dental radiogrpah (c).

Figure 5a

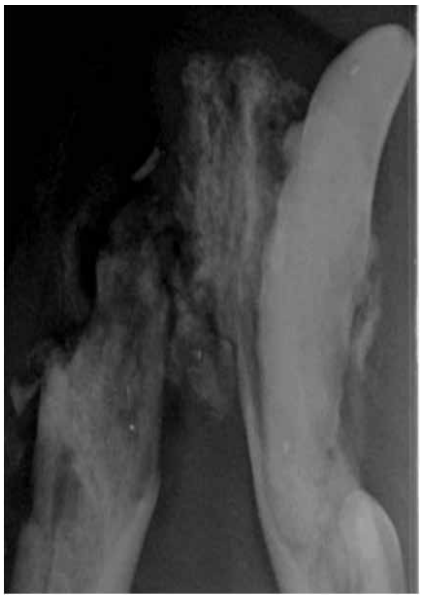

Figure 5b

Figure 5: (a) Dental radiograph (occlusal view of the rostral mandibles) confirmed clinically detectable severe periodontitis (vertical bone loss) at mandibular canine teeth and right mandibular third incisor tooth (the rest of the mandibular incisor teeth are missing) in this old dog. (b) During the surgical extraction of the right mandibular canine tooth a complication with mandibular fracture occured.

Post-operative care

Antibiotics in exodontia are used rarely, and in carefully selected cases, while the use of local antiseptics is highly recommended. Pain management is of an utmost importance and it depends on the extent of the procedure(s). Balanced analgesia approach should be used, combining multimodal pre-, intra-, and post-operative pain management protocols.

Animals should be fed soft food for 3-7 days after extractions and chewing should be discouraged for 7-10 days. Feeding tube placement should be considered in full-mouth extraction cases, especially if the animal was reluctant to eat before the procedure.

Antiseptic oral rinses or gels should be used for 5-7 days after the procedure, and daily tooth brushing re-instituted once the re-check examination (10-14 days post procedure) confirmed good healing.

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