

# Veterinary Dentistry Extraction

## Introduction

The extraction of teeth in the dog and cat require specific skills. In this chapter the basic removal technique for a single rooted incisor tooth is developed for multi-rooted and canine teeth. Deciduous teeth and feline teeth, particularly those affected by odontoclastic resorptive lesions, also require special attention.

Good technique requires careful planning. Consider if extraction is necessary, and if so, how is it best accomplished. Review the root morphology and surrounding structures using pre-operative radiographs. Make sure you have all the equipment you need, and plan pre and post-operative management.

By the end of this chapter you should be able to:

- ✓ Know the indications for extracting a tooth
- ✓ Understand the differing root morphology of dog and cat teeth
- ✓ Be able to select an extraction technique and equipment for any individual tooth
- ✓ Know of potential complications and how to deal with them
- ✓ Be able to apply appropriate analgesic and other treatment.

## Indications for Extraction

### ***Mobile Teeth***

Mobile teeth are caused by advanced periodontal disease and bone loss.

### ***Crowding of Teeth***

Retained deciduous canine.

Teeth should be considered for extraction when they are interfering with occlusion or crowding others (e.g. supernumerary teeth).

### ***Retained Deciduous Teeth***

Never have two teeth of the same type in the same place at the same time. This is the rule of dental succession.

### ***Teeth in the Line of a Fracture***

Consider extracting any teeth in the line of a fracture of the mandible or maxilla.

### ***Teeth Destroyed by Disease***

Teeth ruined by advanced caries, feline neck lesions etc. should be considered for extraction.

### ***Endodontically Diseased Teeth***

Teeth with damaged or contaminated pulp, which the client elects not to have treated endodontically.

## Equipment

A basic extraction kit should be available. All blades should be sharpened **before** sterilisation.

The following list will cover all situations likely to be faced in dog and cat exodontia:

- Suture Kit
- Extraction Forceps – small breed
- Periosteal Elevators
- Tooth Luxators & Elevators
- Instrument cassette tray
- Fahrenkrug canine tooth luxators - set of three
- Selection of dental burs – 701L, 700L, 330, Round ½, 1 and 2
- Bone rasp.

This equipment is covered in more detail in The Dental Workplace chapter. The Fahrenkrug elevators are useful in extraction of deciduous canine teeth.

A selection of luxators is necessary to allow the operator to cater for different situations.

### **Controlled Force**

The instrument should be selected based on the size and location of the root to be removed. Start with a blade which is approximately one third the size of the circumference of the root to be removed.

Instruments used for luxation of roots need to be properly held whilst in use. The handle is placed flat in the palm of the hand with the forefinger aligned along the long axis of the instrument. A finger of the same hand or, possibly, a finger of the other hand must then create a fulcrum and a “rest” or “stop”. The function of the rest is to prevent slippage of the blade.

Holding the wrist next to the body and keeping it straight prevents excessive force. You cannot overdo the force in this position.

### **Single-rooted Dog Teeth**

The basic tooth extraction technique is used for a single rooted tooth (not a canine). All other tooth extraction techniques are derived from this.

#### **Pre-extraction Radiograph**

This establishes the morphology of the root and warns of any fractures or other problems in the target root or with adjacent structures.

#### **Gingival Incision**

Sever the epithelial attachment of the gingiva to the tooth at the bottom of the sulcus (sulcar incision), with a #15 or #11 scalpel blade at a reverse bevel angle of 20 degrees to the tooth. The aim is to separate the gingival tissues from the tooth. The incision should stop at the alveolar bone crest.

**Hint: Initially the soft tissue feels spongy. Carry the blade through this tissue until the bone is felt.**

#### **Luxation**

Select an appropriate size of luxator or elevator.

Apply the tip to the area between the tooth root and the alveolar bone. Feel for the periodontal ligament space and move the blade into it using controlled force. If the space cannot be found, create a channel with a small (1/4 or 1/2 round) burr used down the long axis of the root.

Push the luxator blade in an apical direction, with [controlled force](#). Also, rotate blade axially around the root severing the periodontal ligament. Allow haemorrhage to occur. The hydraulic pressure will help push the tooth out of the alveolus

**Initially it may be difficult to find the periodontal ligament space. Hold the luxator onto the root and wiggle while still under controlled force, but without removing it from the tooth. This will often have the desired effect.**

Continue alternating pushing apically and rotating axially until the tooth becomes loose in the alveolus.

### **Removal of Root**

Remove the loose tooth, with small forceps, using rotational and apical force. This force should not be excessive but is best to be continuous.

### **Management of Alveolus**

Clear sockets of debris by flushing with saline. An alveoplasty is the smoothing of the bone crest and is necessary to allow the soft tissues to be sutured over the site without tension. Reduce any bony abnormalities with a round bur (with water irrigation) or a bone file. If necessary, fill the alveolus with an osseopromotive material to maintain the ridge (Consil™: Vetoquinol UK).

### **Suture**

The gingival tissues should be sutured. The sutured edges should be brought together without tension. Use absorbable single interrupted sutures, spaced no more than 1.5mm apart.

#### ***Advantages***

- Prevents contamination of the site by food and other debris.
- Prevents loss of blood clot leading to post-operative haemorrhage.
- Protects bone and other underlying tissues.
- Creates gingival collars for adjacent teeth unaffected by the disease process.
- Substantially improves patient comfort.

#### ***Disadvantages***

- Possibility of trapping contaminated tissue under flap (unlikely if alveolus managed correctly).

### **Post Extraction Radiograph**

This confirms that all tooth tissue has been removed and that no collateral damage has been created to adjacent teeth or other structures.

## **Multi-rooted Dog Teeth**

Multi-root teeth are more complex to remove due to the strength imparted by two diverging roots.

Begin by taking a pre-extraction radiograph and making a gingival incision as with a single rooted tooth. The general technique is to then reduce the tooth to multiple single roots and then proceed as for single rooted tooth.

## Flap Creation

Flaps are required to visualise the alveolar bone and root furcation for splitting. Flaps can be of an envelope design, where no releasing incision is made. Envelope flaps stand less chance of severing important blood supply to the flap area. Conversely, they require that we disrupt the gingiva of several adjacent teeth.

An alternative is a mucogingival flap with vertical releasing incisions. Make the releasing incisions on the line angle of the roots of the teeth immediately caudal and rostral to the target. Having the incisions slightly divergent will provide a broader vascular base and, also, allow them to be coronally positioned from the original site.

**If releasing incisions are needed, they must be placed off the target tooth or the suture lines may be placed over the void once the tooth is out. This leads to dehiscence.**

## Furcation Exposure

This step is not required if furcation is already exposed.

Remove a semi-circle of bone from the buccal alveolar crest with a small round bur ( $\frac{1}{2}$  or 1). Once the furcation angle is visible, split the tooth into two (or three) single roots with a Taper Fissure bur (e.g. 701, 669, 701L or 700L) working **from** the furcation **towards** the crown and **not** vice versa. This is to ensure that the tooth splits equally.

Remove 1-2mm labial alveolar bony crest circumferentially around the two main roots. Make a small horizontal cut into the tooth roots caudally and rostrally, at the alveolar crest.

## Luxation

Three main movements are used to fatigue the periodontal ligaments. One, two or all three may be required in any given tooth.

1. Wedge the two main roots apart with an elevator blade until the periodontal ligament fibres are felt under tension. Hold pressure for 10 seconds. Reverse the angle of the blade and repeat the process. Do this several times until the roots begin to loosen. Take care not to apply excessive pressures and fracture the root tip.
2. Apply the elevator to the caudal or rostral horizontal cut and, by using the sound neighbouring tooth as a fulcrum (if available), wedge rostrally (or caudally) and upwards. Alternate this process with the opposite root.
3. Select an appropriate size of luxator or elevator. Apply the luxator blade down the long axis of the root, in an apical direction, until resistance is felt, then rotate blade axially around the root. Also, rotate the blade axially around the root severing the periodontal ligament. Allow haemorrhage to occur. The hydraulic pressure will help push the tooth out of the alveolus.

## Removal of Root

Remove the tooth with small forceps using rotational and extrusive force. This force should not be excessive but it is best if it is continuous.

## Management of Alveolus

Clear sockets of debris by flushing with saline. An alveoplasty (smoothing the bone crest) is necessary to allow the soft tissues to be sutured over the site without tension. Perform an alveoplasty to remove bone spicules with a round bur (with water irrigation) or a bone file.

A recent trend is to pack large sockets with osseopromotive material (Consil™: Vetoquinol UK) before suturing the soft tissues. This has considerable advantages in maintaining the blood clot and encouraging new bone growth to maintain the alveolar bony ridge. Rapid loss of bone height, once a root or tooth is removed, is prevented. Under optimum conditions, the alveolus will fill with new bone within six weeks. Without the graft, the socket is colonised by a blood clot, followed by fibroblasts.

## Suture

The gingival tissues should be sutured. The sutured edges should be brought together without tension. Use absorbable single interrupted sutures spaced no more than 1.5mm apart. This is a coronally repositioned flap and should cover the site without tension and should provide the teeth rostral and caudal to the extracted tooth with a gingival collar.

Ensure the flap does not have any tension when sutured. Tension will cause rapid dehiscence. If necessary, under-run the flap until it is loose enough to be placed over the extraction site without any tendency to move back to its original position.

## Post Extraction Radiograph

This confirms that all tooth tissue has been removed and that no collateral damage has been created to adjacent teeth or other structures.

# Canine Teeth

## Introduction

Canine (or cuspid) teeth present special problems in the dog due to their size and curvature.

The upper canines are separated from the nasal cavity by a very thin bone plate on their medial or palatal aspect. Robust use of luxators will cause the apex of the tooth to be forced into the nasal cavity and create an Oral Nasal Fistula (ONF).

Lower canines cross the floor of the oral cavity, from buccal to medial, with the apex located at the caudal mandibular symphysis. The root is, therefore, not accessible for much of its length. Over-robust elevation of the lower canines may well cause symphyseal or horizontal ramus fracture of the mandible.

## Upper Canine

The maxillary canines of dogs are large teeth. Approximately 60-70% of the total tooth length is root and the apex is usually located above the premolar 2. The root juga is palpable for the whole of its length.

Is this tooth mobile? If so – extract as for a single rooted tooth. Take care not to rotate the root apex into the nasal cavity.

If the tooth is well attached, follow the steps below.

1. Palpate the apex of the root by following the root juga (lateral canine eminence) from the gingival margin. The apex is usually located above the mesial (rostral) root of premolar 2. Consider regional local anaesthesia at this time.
2. Incise from the apex of the tooth (above upper premolar 2) to the caudal line angle of the corner incisor some 2mm rostral to rostral border of the canine. This will avoid having to suture the flap over a void.

Incise round the circumference of the canine to sever the epithelial attachments and continue this sulcar incision back caudally as far as UPM2. The incision should look like a reversed 'L' shape.

3. Starting at the pointed angle of the two incisions, use a periosteal elevator to lift a large full thickness muco-gingival flap caudally to expose the entire lateral canine eminence.
4. Cut around the outline of the tooth using a Taper Fissure bur (701L or similar), to a depth of **at least 50%** of the root.
5. Place the blade of a large luxator **along the long axis** of the root from the gingival margin area pointing towards the apex. Start gently, at first at the rostral angle and then alternate with the caudal angle and lift the tooth out of the alveolus at the midpoint. Do **not** elevate from the coronal palatal aspect (i.e. from lateral to medial), as this will tip the root apex into the turbinates.
6. Lift the root out bodily without rotation. Remove any bone spicules with a bone rasp or bur.
7. Flush the alveolus and check for any pre-existing ONF by flushing the alveolus with saline and checking for liquid flow from the ipsilateral nostril. If there is good integrity of the alveolus floor, pack with alloplastic material (e.g. Boneglass™).

**Note: It is common to find an ONF at this stage. If an ONF is present, do not fill with Boneglass**

8. Suture the flap back into position, starting with the leading edge. Use single interrupted sutures, 1.5mm apart, using absorbable monofilament suture material.
9. Use an antibiotic for 5-8 days and an analgesic as required.
10. If an ONF is suspected; recheck the site at 4-6 weeks. If an ONF exists, assess its suitability for further flap surgery at that time.

## Lower Canine

The lower canines present different problems. They are angled from buccal to medial within the alveolus and not along the long axis of the body of the mandible. The root, therefore, disappears away from the operator's vision and access during removal.

Envelope flaps from the area of the central incisor to the premolar 2 on both sides – lingual and buccal - will provide access to the alveolar bone. Bone removal can then take place in order to provide a channel for the luxator blades. Be aware that the root is bulbous, with a greater width than the crown.

An alternative technique describes making a large flap on the floor of the mouth in order to approach the root from the lingual aspect, where the bulk of bone is less (Smith, 1996).

Lingual aspect exposure for some individuals will allow much better visualisation of the apical area than palatal exposure.

Buccal aspect exposure requires some disruption of the lip frenulum and care is necessary when approaching the middle mental foramen and its contents. The middle mental foramen is located under premolar 1 and carries the sensory mental nerve and blood vessels.

Once the flap is made the procedure requires removal of alveolar bone, as necessary, to allow access of the luxator blade to the root. Beware of applying too much force, as either symphyseal separation, rostral mandibular fracture or root fracture are common features of poor technique.

## Deciduous Dog Teeth

### Indications

**Rule of dental succession: Never have two teeth of the same type in the same place at the same time.**

- Failure to remove deciduous teeth when indicated can lead to malocclusions and orthodontic problems in later life. In extreme cases this may require early intervention (by 8-12 weeks of age) to have a reasonable chance of success. Significant retention is mostly a problem with canine and incisor teeth.
- A mixed dentition may be present and this can make identification of teeth to be removed difficult. Radiographs may be needed to distinguish the permanent from the deciduous tooth. If in doubt– **do not remove any teeth**. Litigation commonly follows if mistakes are made. Seek advice from an appropriate specialist.

**Permanent teeth are normally lingual or palatal to their deciduous precursors. The exceptions are the permanent maxillary canine, which is rostral, and the permanent maxillary premolar 4, which is buccal and distal to the last deciduous tooth.**

## Technique

**Take care** - Deciduous teeth can be a challenge to remove and requires great care. They are easily fractured and remaining root tips may **still** deflect the erupting permanent tooth into a malocclusion.

**Take care** - Avoid over-vigorous deep elevation - this may cause permanent damage to the developing enamel on the crown of the succeeding permanent tooth. Be aware of the position of the permanent tooth (see above).

1. The root tends to be long with a similar width for the whole of its length. Use a small root tip pick, Fahrenkrug elevator or fine luxator, depending on tooth size.
2. Make sulcus incision as for single root tooth.
3. Push/probe gently into the periodontal ligament space. If the space cannot be easily found consider a flap and/or create a channel for the instrument using a quarter or a half round bur.
4. When haemorrhage occurs, pause to allow the hydraulic pressure of the blood to assist you in your task.
5. Incise the periodontal ligament for the whole of the root length and apply forceps **only** when tooth is very loose.
6. Close flap with sutures if necessary.

## Cat teeth

### Introduction

The extraction techniques for cat teeth in the main follow those of dog teeth. Exceptions exist where subgingival resorptive lesions (FORL's or "neck lesions") damage teeth roots. Teeth affected by FORL's rarely have a morphologically intact root for extraction. In these circumstances, amputation of the crown and the root tissue, immediately below the alveolar bone crest, may be permissible.

The instruments used for most cat teeth should be small (Winged Elevator #1, Modified Winged Elevator #1, Heidbrink H1 root tip pick or similar).

If a bur is used, a FG 330 or 333L or FG½ or 1 round with water irrigation is best.

Analgesia and post-op management should be considered before surgery. Cats can be challenging for owners to administer drugs post-operatively – particularly if the mouth is painful. Agents should be selected for ease of administration. If the owner cannot administer drugs the cat should be hospitalised for as long as necessary.

## Subgingival Resorptive Lesions

Subgingival resorptive lesions (neck lesions) can partially or wholly destroy teeth. In this circumstance there may not be a complete root to luxate and complete root removal may not be possible. Alternative techniques exist in the literature for these teeth. Some texts describe the amputation of the crown and partial atomisation of roots with a bur. This may be suitable in some circumstances where root destruction and/or ankylosis prevents conventional elevation of the root.

Further reading: *Crown amputation with intentional root retention for advanced feline resorptive lesions – a clinical study.* DuPont G. J. Vet Dent, vol 12, no. 1: pp 9-13 (1995)

**A slow speed handpiece should never be used for this atomisation as the high torque, slow speed and lack of irrigation will cause necrosis and sequestration of the alveolar bone.**

In normal circumstances, there is no substitute for careful elevation and removal of the whole root.

## Complications

### Introduction

The operator needs to be aware of the complications associated with tooth extraction in dogs and cats.

In most instances, complications need to be addressed immediately. However, some may not be immediately apparent. Haemorrhage can occur several hours post-op if the blood clot retracts or is lost by tongue probing. Oral nasal fistulae may take several weeks to become apparent and functional following maxillary canine removal.

### OroNasal or OroAntral Fistula

This complication can occur in any location from the upper canines, caudally. Oro-nasal refers to a communication between the oral and nasal cavity – most commonly at the site of the maxillary canine. Oro-antral refers to a communication between the oral cavity and the maxillary sinus– most common following upper premolar 4 (carnassial) extraction. They are most common where the bone plates are thinnest – either naturally or after periodontal or metabolic disease.

Correct attention at the time of extraction can limit the need for complex flap surgery later.

Debride socket gently with 0.05% chlorhexidine gluconate (CHX Solution™: St Jon VRx Products) and fill with alloplastic graft material if a solid floor is present. This may require a mesh type product (BioSyst™) followed by BoneGlass (Consil™). Suture tissues should be sutured **without tension**. Treat with suitable antibiotics.

Review after four to six weeks to identify the need for flap surgery. This timeframe will allow for wound contraction.

The main reasons for dehiscence of flaps are:

- Chronic osteitis at site from local infection
- Tension on sutures
- Suture lines unsupported and located over a void.

Expect 20% contraction of soft tissue during healing. Tension on flaps is usually due to poor flap design. To prevent this, ensure that the releasing incisions are made off the target tooth, preferably at the line angle of the teeth rostrally and caudally, and that the flap is sufficiently undermined before suturing.

Many ONF's stay open due to the pressure differential between the nasal and oral cavities. After six weeks, if the ONF is large enough to cause chronic rhinitis and sneezing, closure by flap surgery is indicated.



## Haemorrhage

Haemorrhage can be from bone or soft tissue.

Most sockets stop bleeding quickly post extraction with little need for attention beyond gentle pressure, a cold pack or ligation of obvious bleeders and suturing of the surrounding gingiva.

Packing socket with polylactic acid cubes (ADD™) or Bioglass (Consil™) can be expensive but has the added advantage of both obturation of the void and alveolar ridge maintenance.

Haemostatic gauze or pellets may also help, but may have to be removed after a short period (e.g. Kaltostat™).

Electrocautery needs great care. Fulguration (sparking) mode can be used for bone haemorrhage, as can crushing with ronguers or packing with sterile Bone Wax™ (Ethicon). Be aware of the problems of leaving foreign antigenic material buried under a flap.

Beware dogs with clotting factor defects (e.g. Von Willebrand's). Pre-test clotting factors to assess suitability for surgery and hospitalise overnight if required.

## Root Fracture

Root fractures are commonly caused by poor technique. Carnivore teeth taper towards the apex. Over-robust and impatient elevation followed by improper use of forceps will fracture the root.

A fractured fragment containing necrotic pulp or in an infected periodontal pocket will cause bone lysis and must be removed. The operator can delineate the remaining root tissue with a small (e.g. Number ½ round) bur and “walk” down the outside of the root, circumferentially, to isolate it from the bone. This can be described as walking down a spiral staircase with the bur. Use a root tip pick or fine blade luxator to loosen and remove root tip.

Alternatives are:

- Bur away part of the bone plate to remove root tip
- Atomise root tip with high speed round bur with water irrigation - so called "Dental Pulverisation"
- Leave the root tip for a few weeks before a further attempt is made to remove it – but follow the guidelines below regarding litigation.

Beware of the prospect of litigation when root tips are left. It is essential to note broken root tips on the record and, also, to inform the client. Not to do so makes it hard to defend one's position in the event of future litigation. Radiographs at the time and at some appropriate future date, to monitor the root, should also be performed. Consider referral if you are unsure of these techniques.

## Mandibular Body or Symphysis Fracture

Many dental patients for extractions are elderly toy or miniature breeds. Beware of secondary hyperparathyroidism and extensive bone loss due to advanced periodontal disease. Support the body of the mandible with the palm of your hand during tooth elevation.

Great care is needed when extracting mandibular canine teeth to prevent symphysis separation. The periodontal ligament fibres should be properly separated from the tooth before any forceps pressure is applied. Note that the root is often more bulbous than the crown.

## Iatrogenic Damage to Deep Structures

This complication involves iatrogenic damage to the structures deep to the alveolar socket. Many teeth have important structures located beyond the root apex.

Examples are:

- The infraorbital nerve and artery dorsal to upper premolar 4
- Inferior dental alveolar nerve and attendant blood vessels ventral to all lower premolars and molars
- Orbit and globe of eye deep to upper molar 1 and 2
- Hypoglossal nerve and artery lingual to lower molars 1, 2 and 3.

## Post Operative Treatment

### Analgesia

Analgesia may be needed for 48-72 hours post-op with major extractions. In severe cases, full agonist or partial agonist opioids may require hospitalisation. NSAID's can be used **in addition** to this regime. These not only limit pain and discomfort, but also help reduce swelling post-operatively.

Both carprofen and meloxicam can be used parenterally on the day of surgery. Use of all NSAID's assumes good renal and hepatic health. Other NSAID's can be used either parenterally or orally on subsequent days.

### *Dog*

- Morphine 0.25-1 mg/kg every 4 to 6 hours.
- Pethidine 1-3 mg/kg every 2 to 4 hours.
- Buprenorphine 5-10 micrograms/kg every 6 to 8 hours.
- Fentanyl 25 micrograms/hr per patch. Onset up to 12 hours but can last 72 hours.
- Meloxicam 0.2 mg/kg sc. or iv followed by administration in food or per os for 7 to 21 days. Reduce dose after this period.
- Carprofen 4 mg/kg iv or sc. on day of surgery followed by 2mg/kg per os bid for up to 7 days.
- Ketoprofen 2 mg/kg iv/im/sc. up to 3 days **not on day of surgery**. Oral dose is 1 mg/kg. Every 24 hours for up to 5 days.

### *Cat*

- Morphine: 0.1-0.5 mg/kg im every 6 to 8 hours – onset in 15 minutes with superior pain control.
- Pethidine: 3-5 mg for cats every 2 hours – onset in 20 minutes. Good pain control but 10% as good as morphine.
- Buprenorphine: 6-10 micrograms/ kg every 6 to 8 hours – onset in 30 minutes. Fair pain control.
- Butorphanol: 0.2-0.8 mg/kg every 5 hours. Onset in 15 minutes. Very variable effect.
- Fentanyl patch 25 micrograms/hr per patch. Onset up to 12 hours but can last 72 hours.
- Carprofen 1-4 mg/kg iv/im/sc. as a single dose. Can be used on day of surgery.
- Meloxicam 0.3 mg/kg on day of surgery followed by 1 drop per kg per os for four further days. If required further drug can be given at 1 drop per cat per day. Note that this drug is not currently licensed for cats.
- Ketoprofen 2 mg/kg sc. once daily. **Not to be used on day of surgery**. Maximum 3 days.

## **Rabbit**

- Meloxicam 0.2 mg/kg iv or sc. Followed by 1 drop per kg per os daily. This product is not licensed for use in rabbits.
- Carprofen 2-4 mg/kg sc. or iv on day of surgery and subsequently.
- Buprenorphine 0.01-0.05 mg/kg iv or sc. Every 8 hours.
- Butorphanol 0.1-0.5 mg/kg iv or sc. Every 8 hours.

## **Regional Blocks**

Two main sensory nerves supply the teeth and jaws - infra-orbital and inferior mandibular nerves. Pre-operative regional nerve blocks on these nerves greatly assists comfort and reduces the need for powerful analgesia during and immediately after surgery.

Mepivacaine or, preferably, bupivacaine can be used. Bupivacaine 0.5% will provide around 6 hours analgesia for soft tissues and 1.5 to 3 hours for dental pulp. The onset time is 6 minutes. Mepivacaine will provide less time. Mepivacaine HCl (Scandonest™ 3% plain) is supplied as 2.2ml pre-filled cartridges and is used with a dental syringe and 27g x 35mm needles. The dose is 0.25ml to 0.5ml for cats and 0.25ml to 1ml for dogs depending on size.

The infraorbital nerve is sensory to the maxillary teeth via the caudal, middle and rostral superior alveolar nerves. These branches leave the main nerve trunk **before** it leaves the infraorbital canal. For a regional block to be successful the needle **must** enter the canal by 20-32mm, depending on dog size, before depositing the local anaesthetic. Once the nerve leaves the infraorbital canal it is sensory only to the upper lip and nose.

The inferior alveolar nerve innervates the mandibular teeth. All the branches to the teeth have left the main trunk before it emerges from the three mental foramina. The **only** effective method is to deposit local anaesthetic at the foramen on the lingual aspect of the caudal mandible where the nerve enters the bone. This requires either an intra-oral approach or a ventral approach. The intra-oral approach is preferred as it allows greater accuracy. The mandibular foramen is half way along a line between the crown on the last (third) molar and the angle of the mandible. Position the needle at the opening of the foramen and deposit the dose whilst securing the needle with a finger. The operator must be aware of two other branches of the mandibular nerve close to the injection site – lingual and myelohyoid. Accidental anaesthesia of these nerves will desensitise the tongue – possibly with disastrous consequences.

If purchasing a dental syringe (not necessary), ensure that it allows "draw-back" into the ampoule if performing regional blocks into areas where iatrogenic venepuncture is possible, such as the infra-orbital canal (Verstraete, 2000).

## **Antibacterials**

Antibiotics should be used for an appropriate length of time depending on the procedure and pre-existing pathology. This could mean a period of up to three weeks in some cases. This, combined with a palatable chlorhexidine mouthwash (CHX Guard or CHX Guard LA: Virbac) provides a practical and necessary level of hygiene in the healing period.

## **Diet**

Soft foods should be fed for the first two to five days and hard chews and tug toys avoided for 14 days. Muzzling of the dog may be required to prevent traumatic disruption of any flaps.

It is advisable to review the case after 5-7 days. This will allow flaps to heal and ensure that any failure of the suture is picked up by professional examination.

## Key Points

- ✓ Tooth extraction may not always be the best course of action. Before the tooth is removed consider the alternatives (e.g. endodontics) based on the best interest of the patient.
- ✓ The differing root morphology of teeth require a selection of well maintained, modern instruments, used with the proper techniques, to prevent excessive trauma to the patient.
- ✓ There are many potential complications associated with exodontia. You must be aware of what they are and how to deal with them if they arise.
- ✓ The pre-operative and post-operative adjunctive treatment should be considered based on the ability of the owner to administer treatment and the needs of the patient.

## Further Reading

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