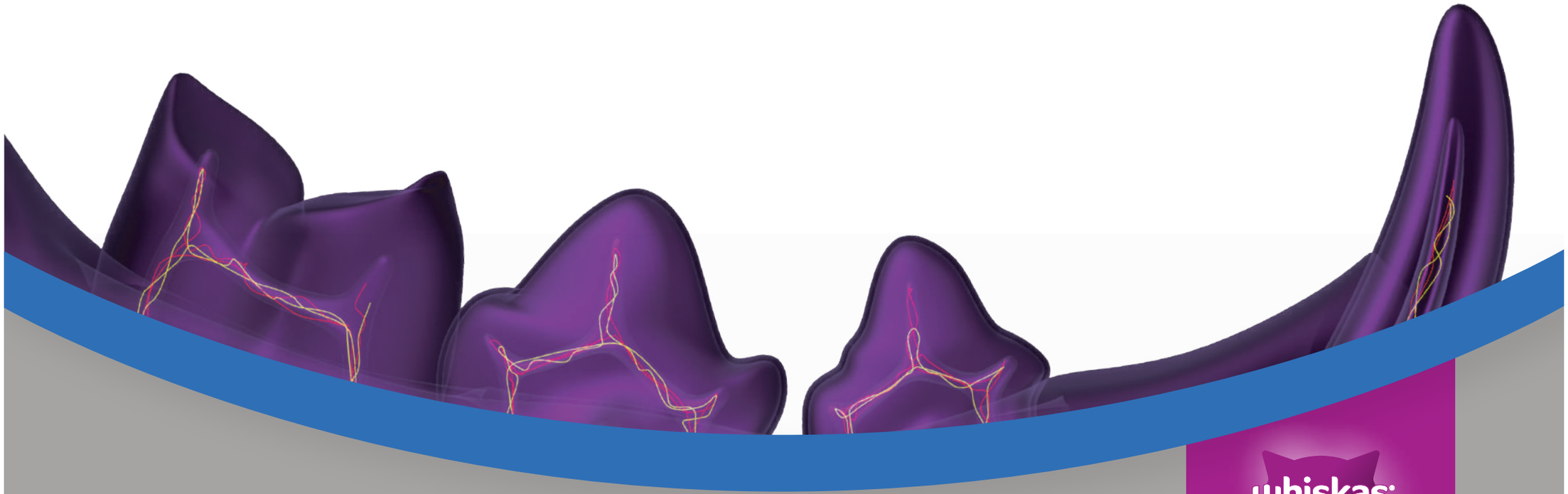
EDUCATIONAL RESOURCE FOR VETERINARIANS

UNDERSTANDING THE NEED FOR DENTAL TREATMENT IN CATS

2nd Edition. November 2023

Lisa Milella BVSc, MRCVS, DipEVDC



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FELINE ORAL DISEASE

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One study of 13,900 cats showed that 9.9% of cats in the age group 0-7 yrs had oral disease as a primary complaint, 20% in the 7-10 year age group and 19.5% of cats older than 10 years. Oral disease was by far the most common disease recognized in cats*.

In addition to periodontal disease, cats also suffer from resorptive lesions, with 29% of cats in the UK having a lesion (Ingham *et al* – 2001), whilst this figure increases to 54% of cats presented for dental treatment.

This guide has been produced to provide a practical dental guide to veterinary professionals, with information on the identification, treatment and prevention of dental problems in cats. It clearly illustrates the progression of disease and shows appropriate diagnoses and treatments.

Finally, with the intent of providing life-long care, it addresses the role of the pet owner and ways of raising awareness of the importance of a good home oral care regime.

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Scientific Communications, Mars Petcare

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John Robinson is acknowledged for his support in the development of this guide.

We at Mars Petcare would like to acknowledge our late friend Lisa Milella for the development of this guide. A highly respected veterinary dentist, Lisa dedicated her knowledge and expertise to alleviating the pain of animals with debilitating dental conditions as well as teaching vets all over the world new veterinary dental procedures.

For reprints or for further information, please contact Marie-Louise Bennett at marie-louise.bennett@effem.com

Ingham KE, Gorrel C, Blackburn J, Farnsworth W. Prevalence of odontoclastic resorptive lesions in a population of clinically healthy cats. J Small Anim Pract. 2001 Sep; 42(9):439-43.

*National Companion Animal Study, University of Minnesota centre for companion animal health; 1996, pg3

OVERVIEW

ANATOMY & PHYSIOLOGY OF PERIODONTAL DISEASE

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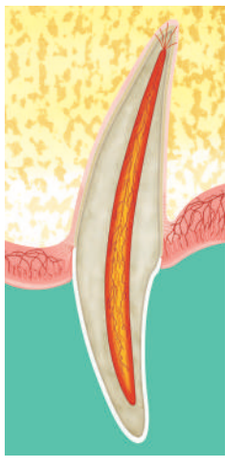
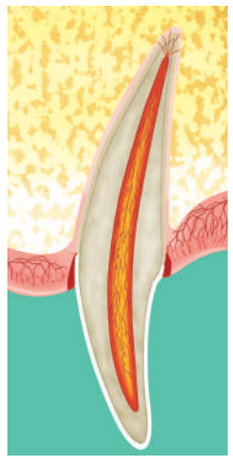
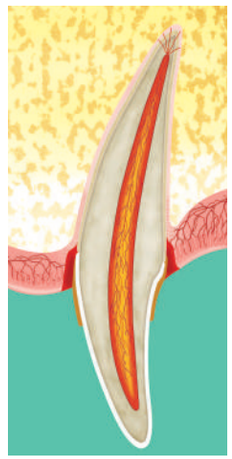


Clinically healthy
No signs of gingival inflammation or periodontal disease clinically evident



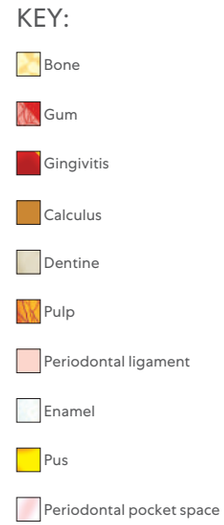
Gingivitis
Gingivitis only. No attachment loss. The height and architecture of the alveolar margin are normal



Early Periodontitis
Less than 25% attachment loss (by probing or radiographically) or at most a grade 1 furcation involvement in multirooted teeth, early radiologic signs of periodontitis

Moderate Periodontitis
25-50% of attachment loss (by probing or radiographically) or a grade 2 furcation involvement in multirooted teeth

Advanced Periodontitis
More than 50% attachment loss (by probing or radiographically) or a grade 3 furcation involvement in multirooted teeth



KEY TERMS

Plaque: An off-white, sticky accumulation on surface of the teeth made up of food particles, bacteria and bacterial products. Plaque is the fundamental cause of periodontal disease and other oral disease, but can be dislodged from the teeth by light scraping – such as brushing.

Calculus: Calculus, also known as tartar or scale is formed when saliva and gingival crevicular fluid – which have high levels of minerals – calcify the plaque on the teeth. Calculus, which has a rough porous surface that harbours further plaque, can form in less than 48 hours from the start of plaque accumulation. Calculus can only be removed by scaling.

Periodontium: The periodontal tissues are the supporting structures of the tooth and include the gingiva, the alveolar bone, the cementum and the periodontal ligament.
Periodontal disease: Periodontal disease can be divided into two categories depending upon whether or not attachment loss occurs.

Gingivitis is inflammation of the gingival tissue without any loss of attachment, Periodontitis is inflammation of all periodontal tissues accompanied by attachment loss.

Gingivitis: Gingivitis is the inflammation of the gingival tissue without any loss of attachment. Gingivitis is caused by plaque along the gingival margin and in the dental sulcus and can be prevented by good oral hygiene techniques. It is a prerequisite for the development of periodontitis, but will not always progress into periodontitis. Gingivitis is the only completely reversible stage of periodontal disease.

Periodontitis: Periodontitis is the progressive inflammation and destruction of periodontal tissues, which leads to attachment loss. This tissue destruction is only partly due to bacterial activity, but mainly due to the hosts inflammatory and immune response. The destruction of the tooth supporting tissues will lead to tooth mobility over time and finally to tooth loss.

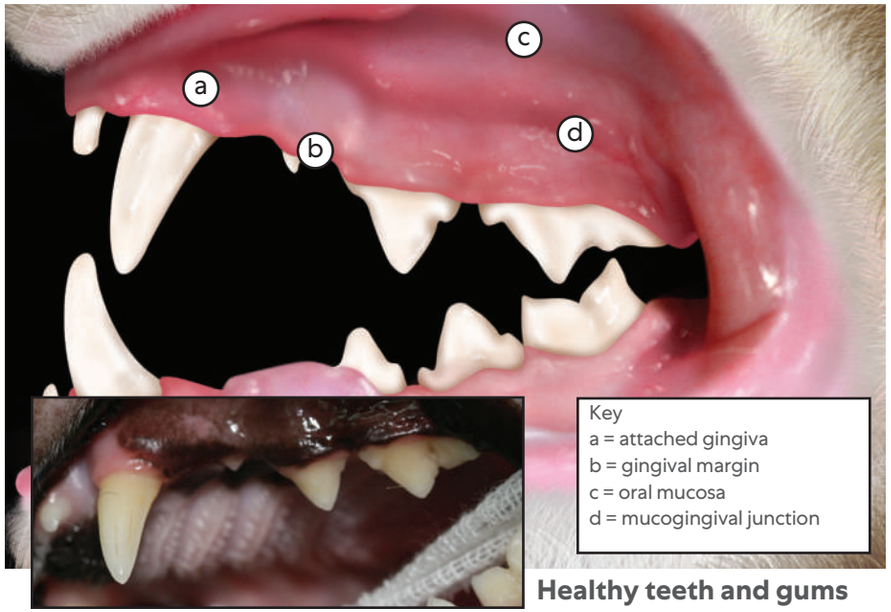
Periodontal pocket: When periodontitis develops, the gingival attachment to the tooth migrates apically along the root, with loss of the attachment of the periodontal ligament. This results in the formation of a periodontal pocket.

Gingival recession: Gingival recession is the migration of the gingival margin away (apically) from its normal position at the base of the crown.

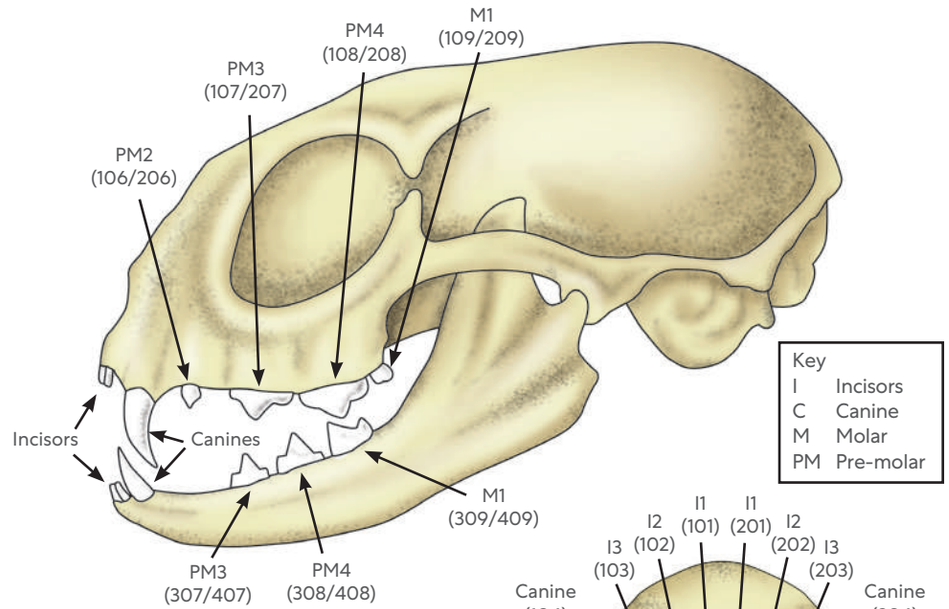
Furcation: The furcation is the area between the roots of multi-rooted teeth. The area is usually filled by alveolar bone, when periodontitis occurs the furcation bone is resorbed. Furcation involvement is staged from 0-3 depending on how far a probe can be introduced in the furcation area.

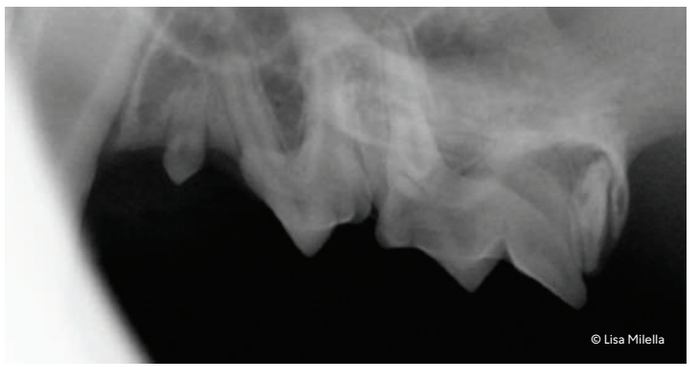
OVERVIEW

ANATOMY & PHYSIOLOGY

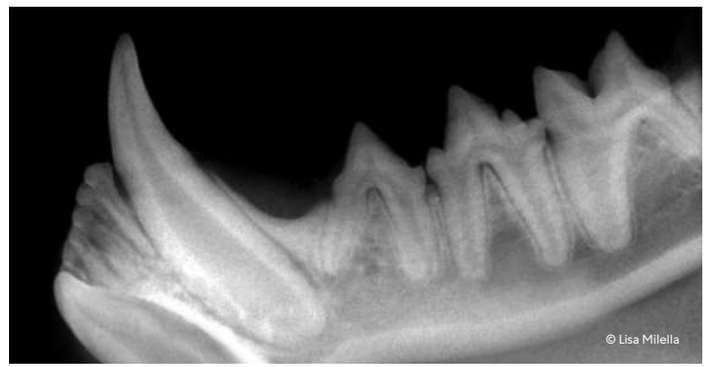


Healthy teeth and gums

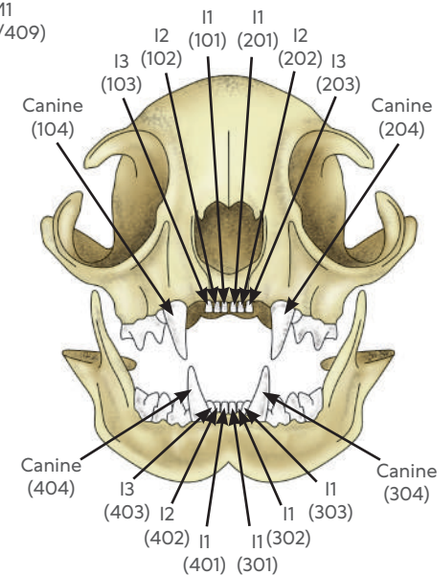




Radiography of a healthy mouth – upper jaw



Radiography of a healthy mouth – lower jaw



FIRST PRESENTATION

3 YEARS OF AGE

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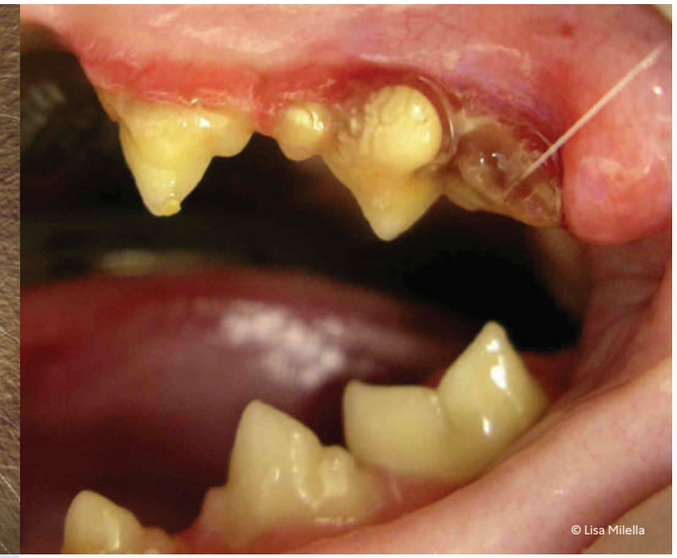

What is seen in this picture?

- Red swollen gums
- Gums prone to bleeding when probed
- Mild calculus build up

Comment

- Periodontitis is a progressive disease.
- First presentation represents a key opportunity to discuss preventative homecare with the owner and long term management.

Overview

- Plaque builds up within hours on a clean tooth, resulting in gingivitis within hours.
- Undisturbed plaque can mineralize to form calculus within days.
- Calculus then provides a rough surface facilitating plaque accumulation.
- If homecare to remove plaque is undertaken from an early age, the progression of gum disease can be dramatically reduced.

FIRST PRESENTATION

AFTER SCALE AND POLISH

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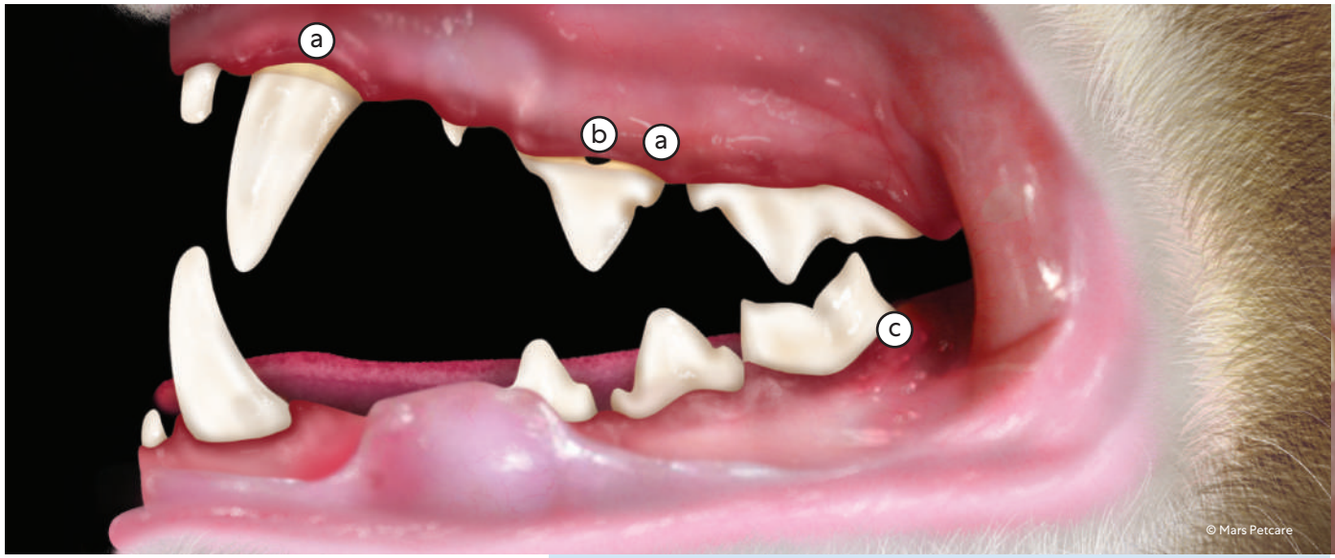

What is seen in this picture?

- Gingival recession exposing cementum (a)
- Furcation exposure (b)
- Periodontal probing depth on the distal root of the lower molar (c)

Recommended treatment

- Oral examination under general anaesthesia using a periodontal probe and explorer probe to examine every tooth and chart the findings.
- Scale and polish all teeth to remove supragingival and subgingival calculus.
- Furcation exposure will harbor plaque and is impossible to keep clean in a cat – this tooth should be extracted.
- Periodontal pockets of more than 1mm in the cat are significant and affected teeth should be extracted. The exception is the canine tooth where a pocket of greater than 3mm indicates a poor prognosis.

Overview

- The changes seen are irreversible.
  A scale and polish alone will not result in new attachment forming around the tooth root.
- Periodontitis will continue to progress if the recommended treatment and follow up homecare are not carried out.

9-12 MONTHS LATER

TYPICAL SCENARIO FOR A CAT – IF NO PERIODONTAL TREATMENT OR HOME CARE WAS PERFORMED

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What is seen in this picture?

- Marked gingivitis
- Visible gingival recession
- Moderate calculus accumulation

Comment

- Gingival recession cannot always be seen until the calculus has been removed. Also, pocket formation cannot be detected until the cat is anaesthetized and each tooth examined with a periodontal probe.
- Progression of periodontitis is inevitable and daily homecare is essential to slow down the progression.

Overview

- If no follow up homecare is performed following a scale and polish, and if the recommended extractions were not carried out, further loss of the supporting structures of the tooth occurs.
- Changes can occur quickly and in some patients the mouth is in the same condition or worse within 3 months of the initial scale and polish.

9-12 MONTHS LATER

TYPICAL SCENARIO FOR A CAT – IF NO PERIODONTAL TREATMENT OR HOME CARE WAS PERFORMED – AFTER SCALE & POLISH

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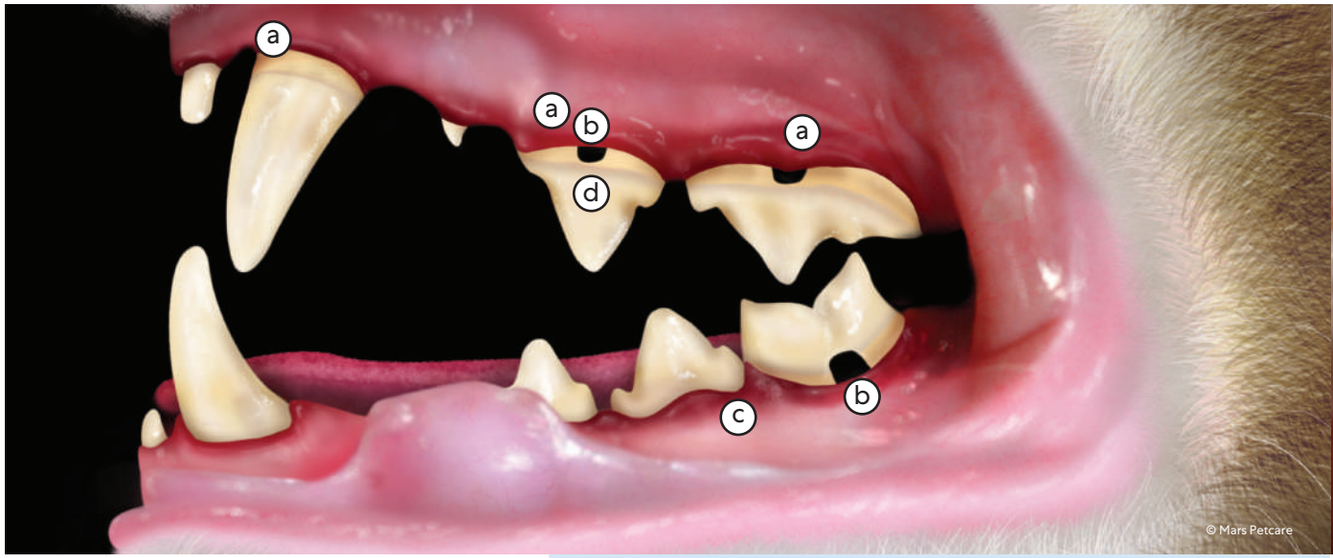

What is seen in this picture?

- Marked gingival recession affecting the canine and maxillary premolars (a)
- Furcation exposure and a resorptive lesion on the lower molar and upper 3rd pre molar (b)
- Periodontal probing depth 2mm (c)
- Resorptive lesion. Loss of tooth substance at the furcation area (d)

Recommended assessment

- Dental examination of each tooth using a periodontal probe to check for attachment loss and an explorer probe to check for resorptive lesions.
- Radiography is required to determine the extent of disease progression and also to assess the resorptive lesions.

Overview

- The extent of the attachment loss has worsened as the teeth with areas of plaque stagnation had not been previously extracted. The cat has also developed resorptive lesions.
- The full extent of the pathology cannot be assessed without the use of dental radiography.

9-12 MONTHS LATER

RADIOGRAPHY – THE FULL EXTENT OF THE DISEASE IS REVEALED

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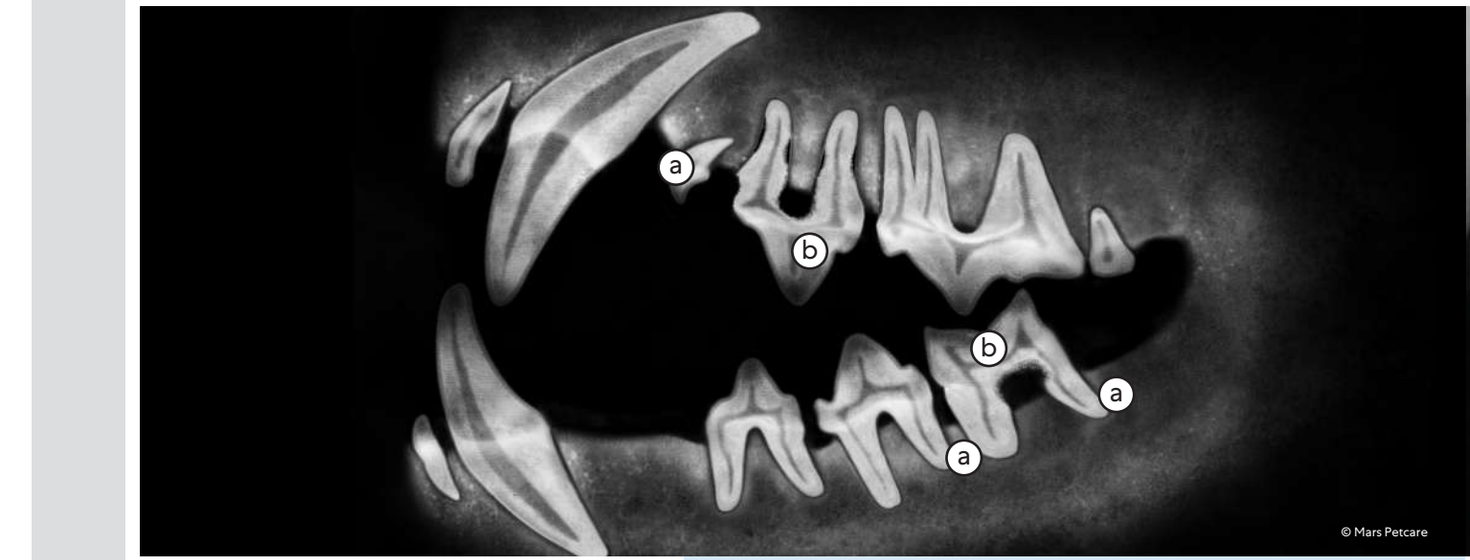

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What is seen in this picture?

- Horizontal bone loss (a)
- Type 1 resorptive lesion (b)

Recommended assessment

- Scale and polish all teeth.
- Extraction of lower molar and upper 3rd pre molar.
- Ongoing homecare to reduce gingivitis with frequent professional dental checks.

Overview

- Without radiography the root and alveolar bone cannot be fully assessed.
- The full extent of the disease processes is often underestimated.
- Resorptive lesions cannot be assessed without the use of radiographs (see p14 for full details).
- Radiographs can also help owners understand the extent of the disease and why treatment is necessary.

TOOTH SECTIONING FOR TOOTH EXTRACTION

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A RANGE OF EDUCATIONAL VIDEOS HAVE BEEN PRODUCED, TO DEMONSTRATE HOW DOG AND CAT TEETH CAN BE SECTIONED IN PRACTICE

The resource has been developed by John G A Robinson BDS, Dentist to the Veterinary Profession, with the support of Mars Petcare.

Why section teeth?

All 2 and 3 rooted teeth should always be sectioned to allow extraction as single root pieces because...

- Roots diverge and so have a different direction of removal from the socket
- Some rotation of the individual root can be employed
- Single root pieces can be loosened separately with less risk of breakage

Variation from normal root morphology

It should always be remembered that a tooth could be different from the normal morphology;

- There may be an extra root e.g. especially the upper 3rd premolar tooth
- A root can have a different shape e.g. more curved (kink or hook) or a bulge
- There may be changes from pathology – mainly resorption

It is strongly advised to obtain a dental radiograph when there is any doubt.

Introduction to sectioning technique

Video 1

Principles of tooth sectioning shown on a 2 rooted premolar tooth

Video 2

Sectioning mandibular carnassial tooth

Video 3

Sectioning maxillary (upper) teeth

Video 4

To watch the videos, please visit:
www.thewebinarvet.com/mars-petcare

DENTAL RADIOGRAPHY

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Dental radiography is one of the most important tools available to the veterinary professional. The bulk of the tooth can only be visualized by means of radiography and much pathology can be missed without its use. In some cases a lesion can be recognized clinically but the full extent of the pathology can only be evaluated with the use of radiography.

Basic equipment needs

X-ray machine: Standard vs dental X-ray machine – most surgeries are equipped with a standard veterinary X-ray machine which can be used for taking dental radiographs but has its limitations. Dental X-ray units have a mobile head and the collimation is confined by the cone. The cone also gives the film focal distance. The kV and mA are set, the timer being the only adjustable control. Wall-mounted or mobile machines are available. A dental radiography unit is easier to use than standard X-ray machines as the machine can be moved rather than the patient.

Film: Intra-oral film must be used to take dental radiographs. Intra-oral films do not have intensify screens and thus need a high exposure, but are required to give the required detail to assess pathology.

Processing equipment: Film is processed in a four bath system in a dark room or light box. Some automatic processors will take dental film or separate automatic processors are available for dental film. The automatic processors deliver a fully fixed film, dried within 5 minutes.

Digital sensors: Although the initial cost set up is high, ease of use and image quality make this a very attractive option. Given the high proportion of patients requiring radiographs, the costs can be easily recuperated.

Techniques used for taking intra-oral radiographs

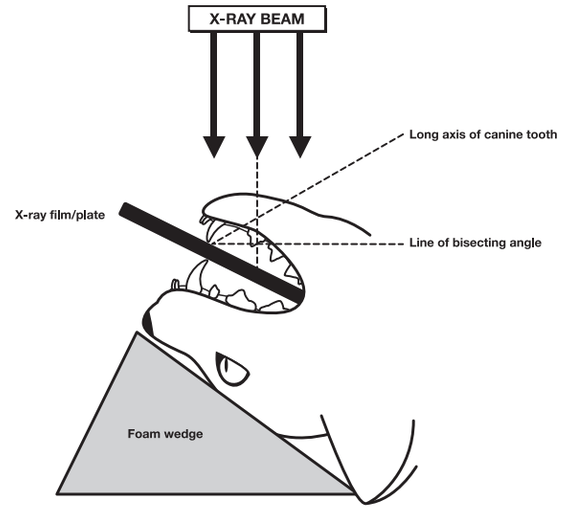
Intra-oral techniques produce radiographs without superimposition of the contralateral side which often occurs with extraoral techniques.

Use the correct size film that will allow the whole area to be examined to be radiographed allowing the best possible positioning. Position the film inside the mouth as close to and as near parallel to the structures to be radiographed without bending the film. This minimizes the risk of distortion. Use paper towel, foam or cotton-wool behind the film to wedge it and maintain its position.

1. Parallel technique
The film is placed parallel to the tooth and the beam is positioned perpendicular to the film and subject. This is only possible in the mouth when the film can be placed intra-orally parallel to the teeth ie. when radiographing the mandibular posterior teeth. The animal is placed in lateral recumbency with the side to be radiographed uppermost. The intra-oral film is placed lingual to the premolar or molar with the dimple facing towards the teeth. The film needs to gently be pushed ventrally to get the lower edge of the film as close to the ventral border of the mandible as possible.

2. Bisecting angle technique
When radiographing teeth other than the mandibular premolars and molars it is not anatomically possible to position the film parallel to the subject. The film should be placed as close to parallel as possible. If the X-ray beam was directed perpendicular to the film then the image would be foreshortened. If the X-ray beam was directed perpendicular to the long axis of the tooth, the image would be elongated. To avoid these problems an imaginary line is drawn half way between the plane of the film and a plane through the long axis of the tooth. This is known as the bisecting angle. The X-ray beam is then directed perpendicular to this line.

To achieve correct positioning requires knowledge of the normal anatomy of the orientation, length and morphology of the tooth roots. Using 2 spatulas can help visualize these planes. A common mistake is to underestimate the length of the roots (especially the canines) and miss the apex.



Indications for taking dental radiographs

- Anatomical changes
- Missing teeth
- Prior to extraction
- Visualising the extent of a lesion for e.g. RL
- Evaluate surrounding bone
- Diagnose a problem (swelling)
- During treatment (root canal/extraction)
- Assessing jaw fractures

LONG TERM

IF THE RECOMMENDED TREATMENT WAS NOT CARRIED OUT

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What is seen in this picture?

- Severe gingivitis and ulceration
- Heavy calculus accumulation
- Missing part of the crown of the lower molar
- Mobile teeth
- Contact stomatitis of the mucus membrane of the cheek
- (Halitosis)

Comment

- Both periodontal disease and resorptive lesions are progressive diseases and need long term management.
- Severe disease has negative systemic consequences as the infection may not be limited to the oral cavity. (DeBowes et al, 1996)
- Resorptive lesions will also result in pain and discomfort to the cat and how this affects their wellbeing is often underestimated.

(DeBowes LJ, Mosier D, Logan E, Harvey C, Lowry S, Richardson DC. Association of periodontal disease and histologic lesions in multiple organs from 45 dogs. Vet Dent 13(2), 57-60, 1996.)

Overview

- No regular dental care ultimately results in tooth loss, preceded by a period of pain and discomfort.
- Other organ systems in the body can be detrimentally affected, and so impacting the wellbeing and general health of the cat.

LONG TERM

IF THE RECOMMENDED TREATMENT WAS NOT CARRIED OUT – AFTER SCALE & POLISH

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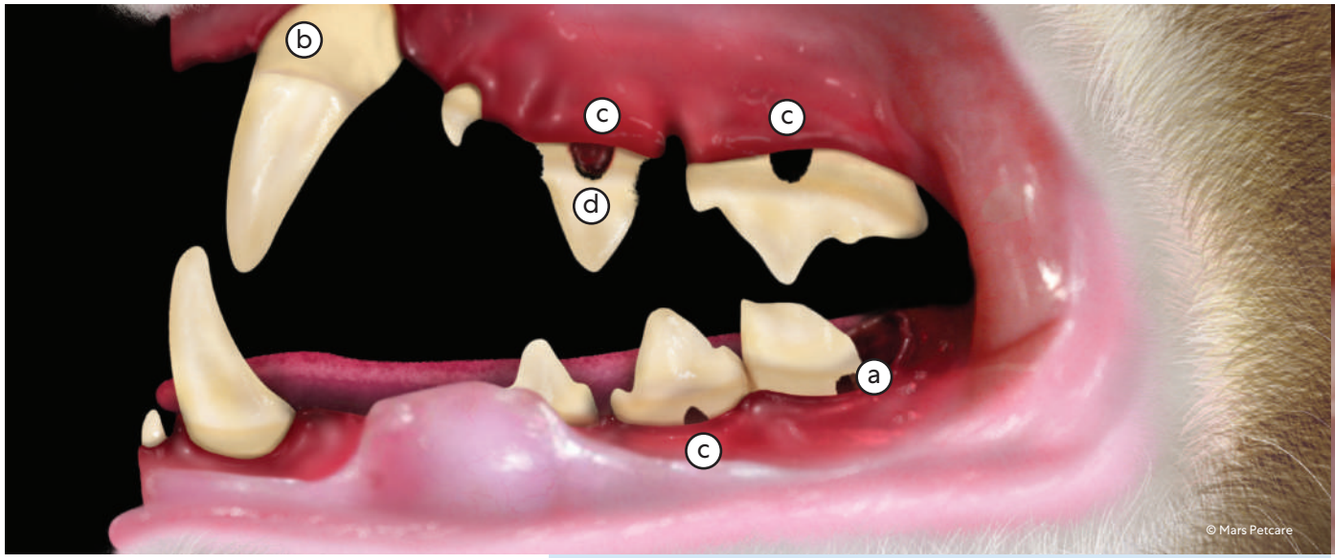

What is seen in this picture?

- Missing crown of the distal cusp of lower molar (a)
- Marked gingival recession on the canine tooth. Attachment loss has led to mobility of the tooth (b)
- Through and through furcation exposure (c)
- Advanced resorptive lesions affecting the premolars (d)

Recommended treatment

- Assess the extent and type of the resorptive lesions radiographically before attempting extractions.
- Radiographs to identify fractured, retained tooth roots are indicated, for example the distal root of the lower molar.
- Assess the quality and quantity of the bone prior to extractions.

Overview

- Multiple extractions are often required, and these are not without complications as resorptive lesions destroy some tooth substance resulting in a weaker tooth.
- Attempted extractions of certain teeth (lower canines especially) affected by resorptive lesions can result in a jaw fracture, if the full pathology is not diagnosed radiographically prior to extraction and the appropriate technique used.

RESORPTIVE LESIONS

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Feline odontoclastic resorptive lesions (RL) affect more than one third of adult domestic cats. The precise aetiology of these lesions still remains unknown despite numerous studies and research projects. Second to periodontitis, resorptive lesions are the most common oral problem seen in cats.

The lesions were first described in 1930. Reports of the prevalence of resorptive lesions show a dramatic increase since the 1960s. Given the need for radiology for proper diagnosis, older surveys not using radiographs possibly resulted in lesions not being diagnosed.

Resorption in teeth

External root resorption may follow any damage to the protective periodontal ligament and cementoblast layer. In man, external root resorption is classified as surface, replacement or inflammatory.

Surface resorption: self-limiting and reversible. Minor trauma, such as unintentional biting on hard objects, can cause localized damage to the periodontal ligament and cementum resulting in surface resorption. Cementum is constantly being remodeled and is capable of resorption and repair. When damage occurs, the affected root surface attracts clastic cells which resorb the cementum and continue to do so whilst they are stimulated. When the resorption stops, cells of the periodontal ligament will proliferate and populate the affected area resulting in reparative tissue.

Replacement resorption: The affected area is resorbed and replaced by bone. This appears to occur when there is no vital periodontal ligament covering the root surface and the population of the resorbed area comes from cells from the adjacent bone marrow. Bone forms directly on the dentine or cementum resulting in fusion between the tooth and adjacent bone. This is called ankylosis.

Inflammatory root resorption: This results from inflammation in the adjacent tissues. There are two main forms, namely peripheral inflammatory root resorption (PIRR) and external inflammatory root resorption (EIRR). In PIRR, the osteoclast-activating factors, which keep the resorptive process going, are provided by an inflammatory lesion in the adjacent periodontal tissues. PIRR occurs immediately apical to the marginal (gingival) tissues and is thus often situated cervically; it has also been termed cervical root resorption.

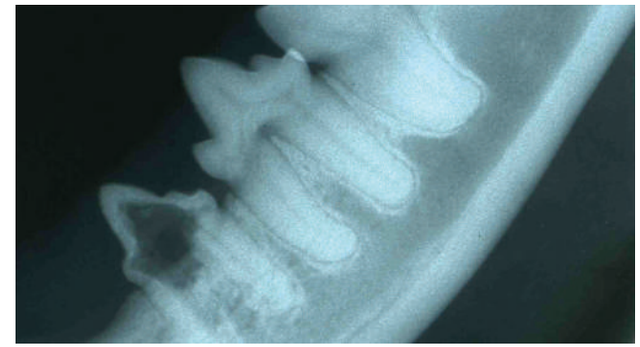
EIRR, on the other hand, receives its stimulus for continued resorption from an infected necrotic pulp. This type of root resorption is a complication that can follow dental trauma. Not only is the surface of the root damaged after trauma, but the pulp may be too. The pulp may become necrotic and release inflammatory and infected products into the periodontal ligament, maintaining the inflammatory process in the adjacent periodontal tissues. Certain studies have suggested that some RLs represent a PIRR type of lesion and are associated with periodontal disease. It is now commonly accepted that there are two distinct types of resorptive lesions affecting cats.

Types of Resorptive Lesions affecting cats

Type 1

These lesions are associated with periodontal disease. Clinically these lesions occur at the neck of the tooth, visible just above the gingival margin. The gingival margin is usually inflamed. Often they occur in the furcation. Radiographically there is little alteration in the root radiodensity or in the appearance of the periodontal ligament space.

The actual resorptive lesion shows as a very distinct radiolucency at the neck of the tooth extending in to the crown. There may also be bone loss between the roots, and the alveolar bone adjacent to the tooth defect is also often resorbed. In one study periodontitis was present in 72% of teeth with Type 1 resorptive lesions and only 15% of teeth with Type 2 resorptive lesions.



Type 2

These lesions are characterized by only slight gingivitis. The lesion usually starts on the root surface and may become clinically visible as a pink discolouration of the crown, and if enamel and dentine has been demineralised, there is a scalloped defect, often covered by granulation tissue. Radiographically there is loss of the lamina dura, periodontal ligament space and root structure. The root density is often the same density as bone.

The lesion visible in the crown may appear as a less dense area. In advanced lesions, the crown may be missing and only resorbing roots undergoing replacement are visible radiographically.

The different types of lesions can only be distinguished radiographically.

RESORPTIVE LESIONS

Aetiology and pathogenesis

Unknown

- Lesions may be evident with or without adjacent inflammation of tissues
- Any factor that creates abnormal formation or mineralisation of cementum could result in RLs

The lesion can commence on any part of the root which has a soft tissue covering. The lesions that are clinically evident are those at the cervical area of the tooth (the CEJ, cemento-enamel junction), sometimes referred to as neck lesions, where the lesion is covered by hyperplastic gingival tissue which is usually markedly inflamed. These lesions and their soft tissue covering progressively extend up the tooth crown. Lesions which commence on the root more apically are not initially clinically visible and can only be detected radiographically. As these lesions enlarge with greater loss of deeper dentine they can become clinically evident as a pink spot on the crown (resorption extending behind the enamel) or crown fracture / loss when its support is destroyed. The incidence of RLs increases with age.

Diagnosis

Many cause no clinical signs at all, but can cause intense pain when the lesion communicates with oral cavity.

Associated with jaw chattering, gnawing movements. Less obvious signs occasionally include lethargy, ptyalism, depression, eating difficulty.

Visual inspection

- Focal hyperplastic gingival tissue – covering tooth defect
- Red spot on crown
- Missing teeth – site may have inflamed covering gingival and / or bony swelling
- Root fragments

Visualisation is aided by drying the teeth using the air stream from a dental air-water syringe. Normally the marginal gingival tissue will lift away from the tooth when the air is directed at the base of the crown. With a RL the soft tissue seems stuck to the underlying tooth. Tactile inspection – use a sharp explorer probe to feel for pits or concavities

Radiography

Radiographs often reveal a lesion that is more advanced than originally suspected from the clinical examination.

Radiographic features of RLs include:

- loss of integrity of the periodontal ligament space
- loss of the lamina dura irregularities on the root surface
- diffuse decrease in radiodensity of the entire root compared with adjacent roots
- radiolucent areas within the root dentine often extending into the crown dentine
- replacement of root substance by bone-like tissue
- resorbing roots present with clinically missing crown

Treatment

The current recommendation is that all affected teeth should be extracted as the lesions almost invariably progress and become more painful. Feline tooth extraction is usually difficult but becomes more so when the integrity of the tooth is damaged by the destructive resorption process. There may be spot ankylosis which may/may not be visible on radiographs.

Type 1 lesions:

The whole root and remaining tooth substance must be removed. Often a surgical extraction technique is required to remove the teeth as the roots are prone to fracture.

Type 2 lesions:

Crown amputation with intentional root retention has been proposed as an alternative to whole-tooth extraction. This technique is acceptable provided pre-op radiographic assessment has been performed, ensuring that the lesion is a Type 2 lesion. However, this technique is only appropriate for teeth that do not have any radiographic evidence of endodontic disease or periodontitis. Teeth with endodontic disease (i.e. periapical inflammation) or periodontitis and teeth in cats with gingivostomatitis or severe gingivitis should be removed entirely.

OTHER DENTAL PROBLEMS

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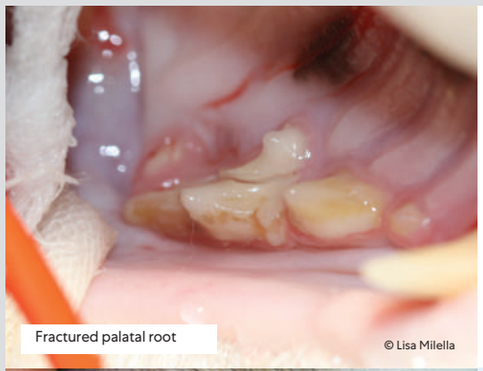
Fractured palatal root © Lisa Milella

Fractured Teeth

If the crown is fractured with pulp exposure, the tooth will need treatment. Pulp exposure is usually seen as a visible pink spot or a black spot if the pulp has become necrotic.

Most often the canine tooth is fractured but an often overlooked fracture following trauma is the palatal root of the upper fourth premolar.

Treatment
Extraction or referral for root canal treatment.


Fractured canines © Lisa Milella


Juvenile gingivitis © Lisa Milella

Juvenile Gingivitis

Certain cats are prone to developing a severe gingivitis following tooth eruption. The cats will often have notable halitosis. The gingival tissues are markedly inflamed and hyperplastic. If left untreated, the disease condition progresses, resulting in early onset periodontitis (irreversible, often necessitating full mouth extractions).

Treatment
Scale and polish with resection of the gingival hyperplasia followed by homecare with a chlorhexidine based product.


Juvenile periodontitis © Lisa Milella


Severe caudal stomatitis © Lisa Milella

Feline Chronic Gingivostomatitis

FCGS is a condition resulting from an aberrant response to plaque accumulation on the teeth. The inflammatory response seen is usually extreme compared to the amount of plaque accumulation on the teeth, and extends beyond the mucogingival junction to involve other oral soft tissues, not just the gingiva.

Treatment
Full mouth extractions is still the treatment of choice with the best long term results. Extraction of the teeth from these cats can be difficult and referral to a veterinary dentist should be considered.


Chronic gingivostomatitis © Lisa Milella

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You know the health of a cat's teeth is really important, but do your clients?

The tiny grooves on **Whiskas® Dentabites** gently clean the tooth surface as the cat's teeth contact the crunchy treats.

They're a client friendly way to provide daily proactive oral care for even the most finicky and uncooperative cats.

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FELINE DENTAL HEALTH MATTERS

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