



## **Dentistry for Nurses April 2014 Mini Series**

### **Session One: What's Normal and What's Not; Assessing Dental Cases**

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***Relevant Anatomy of the Head***

- Maxilla- upper jaw
- Mandible - lower jaw
- Temporomandibular joint (TMJ)- allows jaw movement by articulating the maxilla & mandible
- Orbit – houses the eye ('globe').
- Infra-orbital foramen – the hole through which infra-orbital vessels exit.
- Mental foramen- hole through which the mandibular vessels exit.
- Nasal cavity
- Symphysis – cartilage joint between the two mandible halves



It is vital to be aware of this anatomy as disease processes or iatrogenic damage may affect a number of areas.

Different head shapes exist:

- Brachycephalic – shortened face
- Mesocephalic – normal facial proportion (ie similar to wild dog)
- Dolicocephalic – elongated face

Different species have specific head shapes and are designed to deal with different food types.

***Tooth Anatomy***

Each tooth consists of a crown and root.

**Crown:** The visible part of each healthy tooth is known as the crown.

The shape allows specific function. Its shape ('enamel bulge') can deflect chewed material from the gum margin, preventing damage.

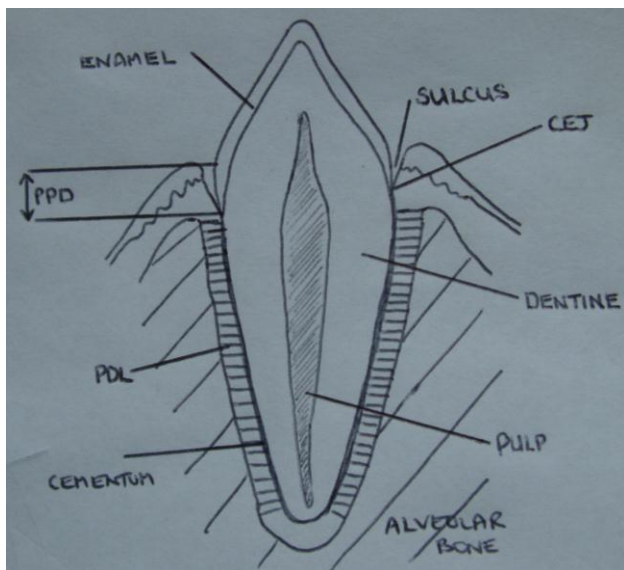
**Root:** The tooth roots are hidden by bone and soft tissue. Provides mechanical support for each tooth. May be single, double or triple rooted; multiple roots are divergent to assist mechanical attachment. They form the majority of each tooth, approx 60-70%.

## Dental Tissues

**ENAMEL:** very hard, glassy-smooth, thin, coats the crown.

**DENTINE:** hard but 'porous' due to tubules radiating out from the pulp towards the outer surface of the dentine. Produced by the pulp and forms the bulk of the tooth. Increases in thickness with age.

**PULP:** the living centre of each tooth; includes nerves, bloodvessels, lymphatics, connective tissue etc. Senses temperature and pain. Produces dentine thus narrows with age.



## Periodontal Anatomy

**GINGIVA** – gum. Keratinised, protective collar for tooth.

**ALVEOLAR BONE** – bone of the socket/ 'alveolus'

**PERIODONTAL LIGAMENT** – fibrous, sensitive (pain and pressure) attachment between socket and root

**CEMENTUM** – thin outer covering of roots; allows root-to-periodontal ligament attachment

## Oral Soft Tissues

### Oral Mucosa

- Oral mucosa is the epithelial lining of the mouth.
- Gingiva is specialised, toughened mucosa.
- Thin, sensitive oral mucosa lines the cheeks and palate beyond the gingival cuff.
- The meeting point of thin mucosa and gingiva is seen as the 'MUCOGINGIVAL LINE'

## **Gingiva**

- Free gingiva – (gum margin) unattached, out-most rim of gingiva
- Junctional epithelium – gingiva-to-tooth attachment
- Sulcus – tiny gap around each tooth, between free gingiva and tooth. Its base is the attachment point of junctional epithelium to tooth
- Attached gingiva – thick collar of tough, keratinised gingiva attached to bone by fibres

## **Neurovascular bundles**

- consists of blood vessels and nerves.
- run within bony canals in the head
- infra-orbital bundle runs through its canal in the maxilla and exits at the infra-orbital foramen
- inferior alveolar/ mandibular bundle runs through its canal in the mandible and exits at the mental foramen

## ***Descriptive Nomenclature & Dental Formulae***

### **Oral Nomenclature**

The head may be divided into 4 quadrants:

- Maxillary (left & right)
- Mandibular (left & right)

Areas are further described using the titles below:

- Labial – adjacent to lips
- Buccal – adjacent to cheek
- Palatal – adjacent to palate
- Lingual – adjacent to tongue
- Occlusal – adjacent to the surface of teeth which meets those of the opposite jaw (ie usually the uppermost surface)
- Coronal – towards the crown
- Apical – towards the root tip (apex)
- Mesial – closest aspect of a tooth to anterior midline
- Distal – furthest aspect of a tooth from anterior midline
- Posterior – caudal
- Anterior - rostral

Combining the above descriptive terms with the tooth identification system (Triadan system, below) enables oral areas, individual teeth and specific sites on teeth to be described.

### **Tooth types**

Teeth vary in shape with different species and the function they perform. The teeth of carnivores have a short crown and larger, true root; these are termed 'brachydont'.

- INCISORS: grooming and nibbling
- CANINES: catching and holding prey ('fangs')
- PREMOLARS: holding and cutting food into segments
- MOLARS: grinding food; however mandibular molars in carnivores ('lower carnassials') also have a cutting function

The cat is a true carnivore. It has evolved to have only those teeth essential to groom, catch prey and cut food. It has fewer teeth than the dog and only one flat-surfaced molar in each side of the maxilla.

Teeth also differ with maturity.

Like us, cats and dogs have deciduous ('primary' / 'baby' / 'milk') teeth which are shed and replaced by permanent ('secondary' / 'adult') teeth as the animal matures.

### **Tooth Nomenclature & Formulae**

Tooth types may be abbreviated:

Incisors= I

Canines= C

Premolars= P

Molars= M

Figures then denote the total number of teeth, of that type, per side.

Teeth in the maxilla are numbered first, while mandibular teeth follow an oblique.

Eg C1/1 = one upper and lower canine normally present on each side of the mouth. There are thus 4 canines in the mouth in total.

The dental formulae for carnivores:

DOG= 2x (I3/3: C1/1: P4/4: M2/3)

This creates a total of 42 teeth in the normal dog.

CAT: 2x (I3/3: C1/1: P3/2: M1/1)

A total of 30 teeth in the normal cat.

Description of each tooth may be added by describing first left or right (L/R) then upper or lower (U/L) then the tooth type & number. Eg LLPM4 = left lower 4<sup>th</sup> premolar.

### **Modified Triadan System**

This also describes teeth. It uses numbers only and is the classification on most dental charts.

Each tooth is assigned a three digit number eg 104

The first number denotes quadrant of the mouth (ie left or right, upper or lower section) in which the tooth lies.

1= right maxillary

2= left maxillary

3= left mandibular

4= right mandibular

The second number eg '04' of 204, denotes the specific tooth and position.

Certain teeth may be useful to act as locators:

Canines- always end in '04'

1<sup>st</sup> Molars- always end in '09'

Thus the number '109' would refer to RUM1 (right upper 1<sup>st</sup> molar), '304' refers to the left mandibular/lower canine (LLC).

### Species Differences

In different species the number of tooth types varies.

The Triadan system is used, but some numbers will be missing as these teeth do not exist in that species.

The teeth present do not change number however; canines are always '04', 1<sup>st</sup> molars always '09'.

Similarly, if an animal has extractions, we do not re-number the remaining teeth!

Eg Feline:

2x (I3/3: C1/1: P3/2: M1/1)

Note the low number of premolars and molars compared to the dog.

The cat is a true carnivore. It has evolved to have only those teeth essential to groom, catch prey and cut food. It has fewer teeth than the dog and only one flat-surfaced molar in each side of the maxilla. The cat does not have 105,205,305,306,405,406 thus numbering reads eg 104 followed by 106 (ie RUC followed by RUPM2) or 304 followed by 407 (LLC followed by RLPM3).

### Eruption Times

#### DOG

Eruption times vary. Below is a general guide to time range:

	DECIDUOUS	PERMANENT
INCISORS	3-5weeks	3-5months
CANINES	3-5weeks	4-6months
PREMOLARS	4-6weeks	4-6months
MOLARS	none	4-7months

## CAT

Eruption times vary. Below is a general guide to time range:

	DECIDUOUS	PERMANENT
INCISORS	2-3weeks	3-4months
CANINES	3-4weeks	4-5months
PREMOLARS	3-6weeks	4-6months
MOLARS	none	4-6months

Since the deciduous teeth shed and permanent teeth erupt over different time ranges for each tooth type, puppies and kittens often have both deciduous and permanent dentition present at any one time. This is known as 'mixed dentition'.

Prior to the time when the permanent, adult dentition erupts only deciduous teeth can be seen. The developing, permanent teeth ('buds') are present - hidden within the bone. These teeth can thus be damaged before they erupt or are seen.

Deciduous teeth have thin, fragile roots. Prior to the time when the permanent, adult dentition is due to erupt these thin roots begin to disappear.

This 'programmed resorption' allows the primary teeth to shed ('exfoliate') easily and allow normal eruption of the permanent dentition.

The immature, permanent tooth has thin walls and an open root tip or 'apex'.

The pulp is wide and the tooth is fragile. As the animal and its teeth mature, dentine is laid down. The walls thicken and the space for pulp narrows with time. The root apex closes gradually, eventually leaving only tiny holes for vessels to enter and exit; this is the 'apical delta'.

### **Occlusion**

An animal's 'bite' or way the upper and lower jaws meet is known as the 'occlusion'. The relationship between the jaws should be balanced in the natural 'mesocephalic' situation eg beagle. Normal occlusion creates a comfortable and functional bite to allow unhindered eating and grooming.

### **Oral & Dental Investigation**

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The high prevalence of dental diseases is well accepted. The significance of this to our patients is marked and choosing appropriate treatment is essential. In order to effectively identify pathology types, severity and location thorough oral investigation is required. Minimal investment in equipment, man-power and time is needed to vastly improve our diagnostic work-up.

The results should be analysed both as a general view of the animal's oral status and on an individual tooth-by-tooth basis. The notion of each tooth being regarded as an individual patient is a useful one. The findings for a mouth, and the dentition within, will commonly span a number of pathologies and potential treatments. Assessing each while also balancing client expectations, compliance and patient factors guides treatment.

The components of investigation are:

- History
- Clinical examination (conscious)
- Pre operative testing
- Exam under GA - probe & chart
  - intra-oral radiography
  - biopsy

### ***History***

A thorough history is required to assess the nature, pattern, location and progression of any presenting problem. Indicators for other disease processes and potential anaesthetic and medication implications are explored. At this stage the wishes and concerns of the client are also often evident. It is important to gauge what client compliance (eg to homecare) may be expected.

### ***Clinical Examination***

This should involve the entire animal, including cardio-vascular and respiratory parameters, with focus on the mouth and teeth as the final part of examination. Inevitably general anaesthetic is required for full oral examination and safety is thus paramount.

Head examination includes:

- General shape & symmetry
- Lymph nodes & salivary glands
- Mucous membrane colour & CRT
- Globe retropulsion (gentle!)
- Muco-cutaneous border examination
- Oral examination - teeth: colour, shape, missing teeth, abnormalities
  - soft tissues: lips, cheeks, tongue

Proceed with caution in animals with uncertain nature!

Oral assessment in the conscious animal is always compromised and may be useless as well as dangerous in a fractious animal. Ensure safer and more thorough investigation by advising anaesthesia if in doubt!



## **Conscious Oral Examination**

Technique relies on firm but gentle handling in the following order:

- Mouth closed, anterior cheek teeth (labial surface, premolars & canines)
- Mouth closed, posterior cheek teeth (buccal surface, premolars & molars)
- Mouth closed, mesial teeth (incisors & canines)
- Mouth open, posterior then anterior teeth (lingual, palatal & occlusal surfaces)

This order progresses from the most to least tolerated mouth manipulations; a growl at any stage should halt the process at that point!

The posterior cheek teeth may be clearly viewed despite cheek tissue as this is normally very elastic and may be retracted adequately at the commissure of the lips.

The pathology noted at this stage is likely to be only part of the true picture. This should be explained to the owner. However, the pathology noted (or any unidentified oral discomfort/ signs) act as the 'admission pathology' for general anaesthesia, thorough investigation and thus ability to gain the full picture.

## ***Pre-Operative Tests***

These should be elected as appropriate based on history and clinical signs. This will include non-oral aspects which may affect treatment or anaesthetic protocol eg renal status as well as specific tests for oral disease. It should be noted however that oral and dental status can have a bearing on systemic health. Most typically one may consider the effects of bacteraemia. Other complex relationships also exist and the oral cavity can affect and act as an indicator for disease eg diabetes (two-way deleterious influence with periodontal diseases), renal compromise (oral mucosal ulceration).

Testing considered:

- Biochemistry
- Electrolytes
- Haematology
- Urinalysis (dipstick & refractometer SG)
- Viral testing – blood eg FeLV, FIV
  - oral swab FCV, FHV

Oral disease is disease! Where unusual or advanced disease pattern is noted testing is advised eg 3yr old Labrador with severe periodontitis.

## **Assessment Under General Anaesthetic**

Full oral assessment requires general anaesthesia:

- Operator safety – sedated animals may still bite (you & films/ sensors!)
- Patient safety – protection of the airways; especially with liquids usage
- Examination quality – enables more thorough examination
- Treatment – treatment required, including surgery, may be performed

### **General oral view**

The opportunities to obtain an 'overview' of the mouth prior to intubation should not be missed! This is especially true for fractious animals where conscious view may be impossible and for occlusion assessment.

**Induction:** Accurate assessment of occlusion cannot be performed in the intubated animal. The tongue must also be temporarily tucked back into the oropharynx in these cases. Ensure adequate anaesthetic depth for operator safety and pre-oxygenation for patient safety first!

**Intubation:** Good opportunity for examination of the oropharynx, tonsils, epiglottis & fauces.

**Chlorhexidine 'Prep':** This is performed once the patient is established as stable under general anaesthesia. Topical antimicrobial activity creates a safer and more pleasant environment for both patient & operator. During application teeth are over-viewed and all soft tissues are examined. This includes all surfaces of:

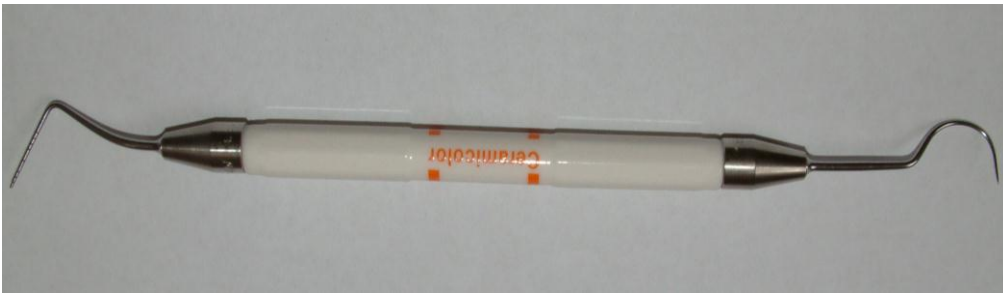
- Lips
- Vestibules
- Tongue
- Palate
- Cheek lining

### **Probe & Chart**

The initial stage of detailed patient assessment, once under general anaesthetic is probing and charting. This requires:

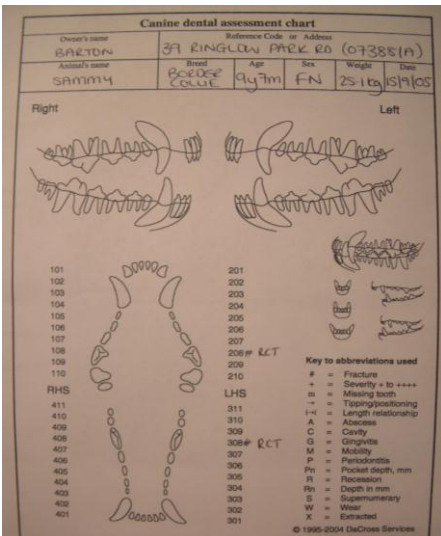
- **periodontal probe** (depth gauge) - rounded tip: soft tissue evaluation
- **explorer probe** – sharp tip for hard tissue tactile investigation
- **dental chart** - 'dentition map'

It is essential that all findings are accurately documented for diagnostic, monitoring and medico-legal purposes.



Periodontal & explorer probe

Dental chart: use writing and drawing space to note all findings in detail, many diseases are site specific, which affects prognosis



Dental chart

Investigation should be carried out in a methodical, sequential manner. Begin at the front of the mouth and work backwards (caudally/ distally) in a tooth-by-tooth fashion. Repeat for each quadrant of the mouth. This is more thorough and actually faster than 'jumping around the mouth'.

**1. Periodontal probe:** has millimetre delineations to enable measurement and a smooth tip for use on soft tissues. A pattern with delineations close together (eg Williams) enables more accuracy of measurement.

Periodontal probe detail - note millimetre delineations



This instrument is used for every tooth **and** over edentulous areas with any signs of inflammation. It gives information regarding:

- Gingivitis – severity (bleeding tendency: score 0-3)
- Periodontitis - Pocket depth (mm)
  - Gingival recession & root exposure (mm)
  - Furcational bone loss (score 0-3)
  - Mobility (score 0-3)
- Lesion quantification – stomatitis & ulceration surface area
  - epulides: hyperplasia to melanoma!
  - measurement and associated damage
- Fracture depth (mm)
- Tract detection & exploration - eg abscess, root remnants

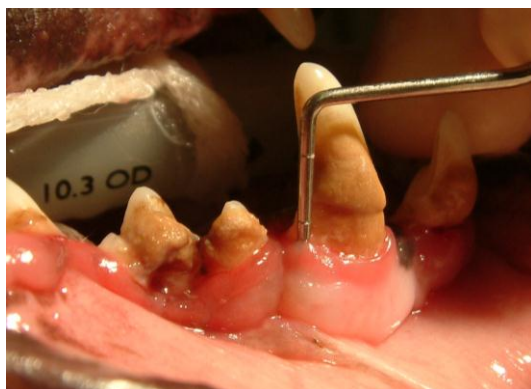
Technique:

- Insert the periodontal probe is inserted into the sulcus
- **gently** advance vertically
- **stop** when light pressure is resisted by attachment tissues
- guide the probe around the tooth circumference 'feeling' for this 'stop'

Any abnormalities eg bleeding, increased probing depth via pockets or gingival hyperplasia (overgrowth) are noted.

**Caution:** excessive force will damage attachment tissues.

Periodontal probe inserted into the sulcus then guided around tooth.



In the case of multi-rooted teeth the probe is used to assess the amount of bone present in the furcation (space between roots of an individual tooth).

**Furcation assessment** is performed by:

- insert probe into the sulcus as above
- attempt gently angling the probe perpendicular to the tooth at the furcation
- assess whether the probe can be inserted to any depth between roots
- repeat for all furcations from all aspects

Use of the probe in a periodontitis case: furcation exposure (F3)



**Mobility assessment** is performed by:

- Shoulder of probe placed against tooth
- Gentle pressure applied to tooth
- assess movement in each horizontal plane
- assess movement in an vertical (out-of-socket) plane

**2. Explorer:** The sharp-tipped explorer is used **ONLY** on hard tissues. It gives visual and tactile information plus an audible metallic 'ting' on catching a rough edge of enamel.



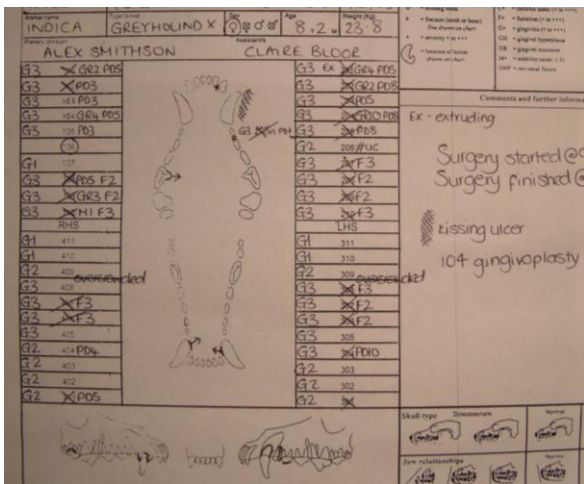
It is used primarily to aid diagnosis of:

- Fractures - including enamel chips & hairline fractures
- Resorptive lesions – including those just subgingival (care!)
- Caries – like pushing into rubber or old chewing gum!
- Restoration flaws
- Pulp exposure - eg via tooth wear (abrasion or attrition)

**3. Charting:** Ensure that all abnormal findings are recorded on the chart and, where possible, give details including location, severity, size (mm) & direction. Examples include:

- Periodontal disease
- Missing teeth
- Damaged teeth
- Abscess & tracts
- Resorptive lesions

- Caries
- Oral masses
- Pre & Post Tx eg extraction



### Filling in the Chart & Disease Scoring

Most charts have a key to aid appropriate indication of pathologies and treatments. Some common examples are:

- Missing tooth – circle tooth number
- Caries – CA
- Resorptive lesion – RL
- Fractured tooth - #
- Extract tooth – single oblique line through the tooth number to identify pre-extraction, finalised as a cross on completion of extraction.

The majority of periodontal pathology is described by millimetre measurement as noted previously. However a grading system exists for many pathology types eg furcational bone loss via periodontal disease and tooth mobility.

#### Furcation score:

- Grade F0 = normal
- Grade F1 = <33%
- Grade F2 = >33%
- Grade F3 = 100%

#### Mobility score:

- Grade M0 = normal
- Grade M1 = horizontal movement  $\leq 1$ mm
- Grade M2 = horizontal movement  $\geq 1$ mm
- Grade M3 = vertical & horizontal movement

or

(multi-rooted) horizontal movement  $\geq 1$ mm

Calculus and plaque indices are not required- although some advocate their inclusion the fact that these parameters are not in themselves disease, are expected to be present and will be removed causes this author and many colleagues to view this as unnecessary. One may make a note of general pattern if desired which may be of assistance regarding homecare guidance. It is likely however that gingivitis and other periodontal health indicators would fulfil this role.

### ***Making the Chart Work***

Thorough probing and charting of the resultant information is extremely efficient. A completed chart negates the need to then keep rechecking the probing – trust the chart and use it as your guide! This does of course make doing it correctly the first time critical!

The finished chart should be archived with any associated material eg laboratory results, history, dental radiographs in a clear wallet within a ring-binder arranged in chronological order. Correctly completed charts have multiple benefits:

- Efficient - maximal information in minimal time & writing
- Permanent record – no memory required!
- Educational tool for clients and colleagues
- Monitoring
- Medico-legal document

### **Radiography**

Intra-oral radiography is mandatory for full diagnostic investigation. Omission of radiography will result in the operator missing enormous amounts of pathology, as the roots remain invisible. Clearly this is of detriment to patient, client and practice alike. Human dental films or digital dental sensors should be used. Normal Xray machines can be utilised but a dental Xray machine gives great benefit in speed and ease of use. This equipment is relatively cheap and investment in it and learning intra-oral radiological (bisecting angle) technique will pay dividends.

### **Biopsy**

Biopsy should be performed for **all** masses & abnormal lesions!!!

The information you gain from the histopathologist is essential but only as good as the sample you send. The following steps should be adhered to in order to obtain a good and diagnostic sample:

- Wedge biopsy
- Avoid tissue heating & trauma
- Sufficient size
- Adequate depth – including underlying bone where relevant
- Avoid ulcerated / inflamed areas – this compromises interpretation
- Label / orientate on dental chart – ensure you can identify in retrospect!
- Twin with radiography – where a mass is near any underlying bone
- Oral pathologist – try to send to one with an interest in oral pathology
- Discuss, refer, resample - if the results don't match the clinical picture

## **Summary**

It is this investigatory information which, combined and considered, will determine what diagnosis made and thus what treatment is elected. The quality of the information is therefore critical to outcome success and ultimately patient welfare. Error or complacency at any stage will produce a 'domino-effect' leading to potentially wrong or compromised treatment. Ensure that a meticulous and thorough investigatory approach is used in every case!

## **ORAL PATHOLOGY & TREATMENT**

### **Trauma**

The mouth and teeth are areas frequently affected by trauma such as road traffic accidents, falls or chewing and catching hard objects. Pain and further problems are common sequelae.

### **FRACTURE**

Fracture of teeth may be at any level through crown and/ or the root with variable depth and direction.

UNCOMPLICATED FRACTURE: the pulp is NOT exposed

- a layer of dentine +/- enamel remains
- may be sufficient to protect the pulp

COMPLICATED FRACTURE: pulp exposed

- fracture passes through dentine to expose pulp at the fracture site.
- fresh fractures bleed and cause pain.
- bleeding ceases, bacteria invade the pulp
- pulp inflammation ('pulpitis') and infection result
- pulp changes from pink to red to brownish.
- infection and inflammation works towards the root tip ('apex')
- pulpitis is painful and may result in bone damage around the apex
- eventual 'pulp necrosis'.
- abscess may form causing pain and bone damage.

'Slab fractures' affect the side of a tooth. These often extend under the gum and may be uncomplicated or complicated.

### **Treatment:**

#### 1) UNCOMPLICATED

- Enamel damage only – smoothing/ 'odontoplasty' of sharp edges
- Superficial enamel & dentine - smoothing/ 'odontoplasty' of sharp edges & seal/ restoration
- Deep enamel & dentine – as for complicated fractures



## 2) COMPLICATED

- Periodontitis / deep subgingival fracture line – extract
- Healthy attachment - extract or root canal (endodontic therapy)

Fractured teeth MUST be treated as discomfort may be experienced at any point. Abscessation is a late stage and extremely painful. 'Wait and see' is NOT an option!!

## DISCOLOURED TEETH

Tooth discolouration varies from pink to purple, brown and grey and is often associated with a prior traumatic event.

- pulpal bleed secondary to trauma
- blood pigments and breakdown products taken up by dentine
- tooth stained pink-purple, eventually grey with pulp necrosis
- pulpitis and pain
- pulp may either recover or die
- pulp necrosis may result in abscessation

Radiography is essential to assess whether the tooth is dead.

Pulp deposits dentine, thickening the tooth walls. A dead tooth has thinner walls than its live counterpart. Left and right comparison views are needed to assess this. The difference is only visible after sufficient time for disparity. Grey discolouration may also occur due to presence of black, necrotic pulp. Potential causes:

- Thermal damage – polishing, scaling, heat-cautery/ diathermy
- Fracture
- Caries - tooth decay

### **Treatment:**

Discoloured dentition should be either extracted or undergo restorative root canal therapy to save the tooth. Restoration is less traumatic and invasive but requires specialist treatment, may be more costly and is not possible in every case.

## 1) NO RADIOGRAPHIC PATHOLOGY

- Recent trauma - radiographic monitor repeated in 3-6months
- Old trauma – radiographic monitor in 12months
- Signs of discomfort – as below

## 2) RADIOGRAPHIC PATHOLOGY/ DISCOMFORT (NON-VIABLE PULP)

- Periodontitis / deep subgingival fracture line – extract
- Healthy attachment - extract or root canal (endodontic therapy)

Discoloured, non-viable teeth must be treated as discomfort may be experienced at any time. Abscessation is a late stage and extremely painful.

## **SUBLUXATION**

Horizontal trauma results in tooth loosening via periodontal ligament damage. Tooth and/or socket bone may suffer fracture during the traumatic incident. The blood supply to the tooth may be damaged thus tooth may be left in situ if immobile but must be radiographically monitored for pulp death.

## **LUXATION**

Tooth and/or socket bone may suffer fracture during the traumatic incident.

**LATERAL LUXATION:** Lateral trauma pushes crown in one direction and the root in the opposite. Alveolar bone fracture is associated.

**INTRUSION:** Vertical trauma pushes the tooth into the socket.

**EXTRUSION:** Trauma pulls the tooth out of the socket.

**AVULSION:** Total loss of tooth from alveolus.

The blood supply to the tooth is often compromised and may result in pulp necrosis.

### **Treatment:**

- 1) NO OTHER PATHOLOGY - Stabilisation by splinting & endodontic treatment once stable
- 2) OTHER PATHOLOGY - extract

## ***Dental Disease***

### **FELINE RESORPTIVE LESIONS**

'RLs' are also known as feline odontoclastic resorptive lesions ('FORL') or (slang) 'neck lesions'. Most lesions are first noticed as pink-red irregularities at the base of the tooth crown, adjacent to the cemento-enamel junction. They begin in the root and are only visible at a late stage when they have worked upwards to the crown.

Lesions on roots may only be detected by xray. Once at the crown they form rough holes in the tooth which are detected by use of the dental explorer. The crown of the tooth becomes fragile and may break off leaving roots behind resulting in inflammation and discomfort. Periodontal ligament destruction occurs as part of the resorptive process and roots may become fused to the socket (ankylosed).

### **Treatment:**

Restoration is ineffective; RL-affected dentition should be extracted. This may be difficult due to resorption. Truly ghosted teeth which have been completely replaced by bone may undergo coronal amputation. Note that this is NOT the same as atomising fractured root tips!!!

## **CARIES**

Caries ('tooth decay') affects flat-surfaced teeth such as the molars. It is caused by bacteria feeding on sugars and producing acid which etches away tooth material, forming holes ('cavities'). These feel softened when assessed with an explorer. Frequent feeding of sugars increases risk.

### **Treatment:**

Affected teeth must be extracted or restored.

- 1) SUPERFICIAL LESION – restoration ('filling') or extract
- 2) LESION IN/ NEAR PULP – root canal therapy or extract
- 3) WIDESPREAD DESTRUCTION/ OTHER PATHOLOGY – extract

### ***Restorative Treatments***

Endodontic treatment refers to the pulp-dentine organ.

Fracture, trauma or caries cases may often be restored rather than extracted. This may be a filling or root canal. Pup capping is used only for immature animals.

- Fillings (no pulp involvement) eg early caries cases
  - Retain tooth and bone, quick, atraumatic, low cost
  - Referral, requires monitoring (filling loss/ caries recur)
- Root canal therapy
  - Atraumatic, retain tooth, retain bone
  - Referral required, cost, monitor, occasional further treatment

## **PERIODONTAL DISEASE**

Teeth affected by periodontitis may be saved by periodontal surgery to reduce pockets:

- gingivoplasty/ partial gingivectomy- reduce depth directly
- curettage and root planing – allow reattachment
- crown lengthening
  - Saves teeth and bone
  - ONLY where owners are committed and able to brush teeth daily, referral required

This is ONLY possible with meticulous homecare by owners.

### ***Malocclusion***

An animal's 'bite' or the relationship between upper and lower jaws is known as the 'occlusion'. This should be balanced in the natural situation such as that of the mesocephalic beagle.

Normal occlusion creates a comfortable and functional bite to allow the animal to eat and groom normally without trauma to any adjacent teeth or tissues.

The **dental interlock** holds the upper and lower jaws in synchrony as they grow. It consists of the lower canine fitting along a groove between the last (3<sup>rd</sup>) upper incisor and the upper canine and the incisor scissor bite

Malocclusion refers to the ABNORMAL fit of teeth and/ or jaws. This may result in trauma to other teeth or soft tissues. Traumatic malocclusion affects the animal's comfort and function and thus requires treatment. It may be seen with deciduous and permanent teeth.

Malocclusion may be due to:

- position of individual teeth 'dental malocclusion'.
- relative jaw sizes 'skeletal malocclusion'.
- Both individual teeth and relative jaw size combined

Most commonly brachycephalics show malocclusion!

**Deciduous teeth** which fail to shed before the adult teeth erupt are known as 'retained' or 'persistent' primary dentition. This may cause or worsen malocclusion by obstructing the normal eruption path of the following permanent tooth. This may occur with any tooth type but is commonly most severe with canine teeth.

Adult lower canines erupt medial ('lingual'-close to the tongue) to the deciduous/ temporary canines. Persistent deciduous canines thus force the adults to erupt 'inside' them, resulting in canines which damage the roof of the mouth (palate).

Areas of tooth overcrowding retain plaque, are hard to clean and thus predisposed to periodontal disease. Persistent primary teeth thus cause risk both to themselves and the permanent counterpart.

Succession: only one tooth of any tooth type should be present at a location at one time- ie one should not find both primary tooth plus its adult counterpart together.

### **Eruption Times - DOG**

Eruption times vary. Below is a general guide to time range:

	DECIDUOUS	PERMANENT
INCISORS	3-5weeks	3-5months
CANINES	3-5weeks	4-6months
PREMOLARS	4-6weeks	4-6months
MOLARS	none	4-7months

OVERSHOT: The maxilla is relatively longer than the mandible and lower canines may be more likely to damage the palate. In severe cases oronasal fistulae may form.

UNDERSHOT: The maxilla is short relative to the mandible length; upper teeth may damage lower teeth and adjacent tissues.

Each quadrant may have a different growth rate and potential. The dental interlock maintains overall co-ordination of growth. Where co-ordination is lost and one side grows more than another we get 'WRY BITE'

### **Treatment:**

Dental treatment may only be planned correctly where an accurate diagnosis has been made from appropriate investigation. **Orthodontics** refers to treatment to restore normal jaw and tooth relationships to ensure a comfy and functional bite - NOT for cosmesis!!!

Where abnormal jaw or tooth positioning cause damage options may be:

- 1) Extraction - may be complicated; ensure radiographic examination first!
- 2) Shortening - involves endodontic treatment, NEVER simply cut the top off!
- 3) Tooth movement - complex, NEVER experiment eg with bands!

Extraction alternatives:

- Atraumatic, retain tooth, retain bone
- Referral required, cost, occasional further treatment/ monitor

Clients should be made aware of treatment options available, and the relative advantages and disadvantages of each, in order to make an informed choice for their pet.

### **OTHER ABNORMALITIES**

A vast array of congenital, hereditary & developmental abnormalities exist. The approach should be the same for all instances:

1. thorough oral assessment via probe & chart
2. dental / intra-oral radiography
3. biopsy where applicable

Perhaps the most commonly noted abnormality, generally considered to be developmental, is **enamel dysplasia**. This appears as patches or bands of abnormal enamel (often yellow-brown & flaky) or missing enamel areas on one or more teeth. Sufficient enamel may never have formed (enamel hypoplasia) or formed abnormally (eg enamel hypomineralisation). Upon eruption teeth may initially appear normal.

Chewing then leads to loss and staining of abnormal enamel and evidence of the condition often arises at 6-12m of age.

The cause may be pyrexia, drugs (often leading to multiple affected teeth) or trauma (usually one or two teeth in a localised region affected) occurring during enamel formation of the developing tooth in puppies or kittens.

Poor enamel renders the tooth susceptible to ingress of toxins or bacteria with eventual pulpitis and infection possible, as well as weakening the tooth. In addition root formation may also be abnormal.

**Treatment:**

Consists of removal of abnormal enamel and seal of the underlying dentine. More advanced restoration may be performed for more extensive patches, especially on canines. Radiographic monitoring is performed to ensure normal tooth development thereafter.