



Dentistry for Nurses April 2014 Mini Series

Session Two: Periodontal Disease-The Hidden Epidemic in Your Practice

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PERIODONTAL DISEASE

Aetiology & Pathogenesis

Plaque is a tooth-coloured, sticky paste which coats the mouth surface.

It consists of:

- Saliva
- Bacteria

(Salivary fluid and 'commensal flora' - bacteria normally found in the mouth- are always present.)

Plus:

- Food material
- Cells shed from the mouth lining

Plaque will be found in every mouth but is worsened by eating sugary or sticky food. This aids the bacteria in attaching to the smooth enamel tooth surface.

The paste forms a '**biofilm**'- an organised coating over mouth surfaces. This is difficult to remove and will not simply wash off. Mechanical disruption by tooth brushing is most effective for removal.

The plaque layer thickens over time and the oxygen is used up, creating an anaerobic environment. The gram positive, aerobic commensal bacteria are replaced by gram negative anaerobes. The anaerobes produce toxins and induce inflammation of the adjacent soft tissue: gingiva.

Calculus is produced by mineralisation of plaque. A rough-surfaced, hardened 'honey-comb' of calculus forms over time with the minerals present in saliva. This does not itself cause disease but helps retain disease-causing plaque.

Calculus is also known as tartar or scale.

Periodontal Disease

Periodontal disease refers to inflammation and infection of the periodontal tissues.

Inflammation is caused by irritation and toxin release from adjacent plaque bacteria.

Depending on the tissue or tissues involved, we distinguish between different periodontal diseases.

Periodontal Tissues

- 1) **Gingiva (modified oral mucosa)**
- 2) **periodontal ligament**
- 3) **cementum**
- 4) **alveolar (socket) bone**

Periodontal diseases considered: **gingivitis, periodontitis, gingivostomatitis**

Gingivitis

Gingivitis is inflammation of the gingiva.

Inflammation is caused by irritation and toxin release from adjacent plaque bacteria.

Gingiva is one of the periodontal tissues; gingivitis is thus a periodontal disease.

Gingiva

- Free gingiva – (gum margin) the unattached, out-most rim of the 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

Bacteria near the gingival margin and in the gingival sulcus (versus on the tip of the tooth's crown) tooth is thus the most important to gingivitis formation.

Gingivitis - inflammation of the gingiva - is identified by:

- Increased vascularity
- Erythema
- Swelling
- Bleeding

The swollen gingival margin increases sulcal depth, thus helping retain even more plaque within the space.

Gingivitis Severity Scoring

The severity of gingivitis may be identified by a scoring system. This system is the modified Loe and Silness index, based on tendency of gingiva to bleed when gently probed.

[below in coloured box]

0 = no inflammation; healthy gum

1 = mild inflammation; reddening or swelling but no bleeding

2 = moderate inflammation; reddening, swelling, delayed bleeding on probing

3 = severe inflammation; marked reddening, inflammation & immediate bleeding

Gingivitis is reversible.

Reversing diseased gingiva back to healthy gingiva relies on plaque removal.

The tooth surface does not shed cells like the skin or mouth lining does, thus brushing is needed to remove the coating of plaque.

When gingivitis is left unchecked it may progress to periodontitis.

In some cases the gum over-grows as a response to inflammation.

This is known as 'gingival hyperplasia.'

It is also influenced by genetics and some drugs.

The sulcal depth increases forming a 'pseudo-pocket' which holds plaque even more effectively, worsening the problem.

Periodontitis

Periodontitis is the inflammation of the four periodontal tissues.

Periodontitis is thus a periodontal disease.

Periodontitis is irreversible.

The tooth attachment becomes compromised as inflammation damages the periodontal ligament, alveolar ('socket') bone and cementum.

This begins coronally, in the sulcus area.

The level of attachment to the tooth surface begins to migrate down the root.

Inflammation adjacent to bone induces bone loss.

Bone loss due to periodontitis may be horizontal or vertical:

Horizontal: The attachment level drops with bone loss and gum recession leading to tooth root exposure. In multi-rooted teeth the furcation may often be exposed. This may be described as furcational bone loss.

Vertical: The attachment level drops but bone loss is limited to that closest to the root. The gingiva does not recede thus a pocket forms. The roots are exposed to the inside of the pocket only and thus not obviously visible.

It is the animal's own inflammatory response to the plaque-induced irritation which damages the tissues. Unfortunately, in periodontitis, inflammation is rather self-destructive!

Gingivitis MUST be present for progression to periodontitis BUT not all cases of gingivitis will worsen to periodontitis.

Periodontitis goes through active and inactive phases.

Several factors influence the progression of periodontitis:

- Genetics – eg some pure-breds
- Immune status – poor immunity due to organ compromise, FIV, FeLV, diabetes, malnutrition
- Malocclusion – eg overlap & overcrowding of teeth
- Body Mass – miniature breeds have lower amounts of socket bone available
- Food – sticky food where natural chewing is avoided enables greater plaque accumulation

Periodontitis may result in:

- Halitosis
- Pocket formation
- Root exposure
- Tooth mobility – reduced socket attachment
- Tooth loss – severe attachment loss
- Abscess formation and pain
- Organ compromise and ill health

Bacteria or their toxins may enter the blood stream via the inflamed tissues resulting in a systemic effect. The 'bacteraemia' or 'toxaemia' occurs during chewing, eating and procedures such as scale (calculus) removal.

This is likely to result in ill health.

Bacteria may cause damage to distant organs such as heart and kidney.

Existing disease such as diabetes may be worsened.

The primary underlying cause of periodontitis is plaque.

Periodontitis, unlike the other periodontal disease of gingivitis, cannot be reversed by plaque removal.

Plaque removal is used to arrest or reduce progression of periodontitis; the damage already caused is permanent.

Gingivostomatitis

Gingivostomatitis refers to inflammation of both gum ('gingivo') and mouth lining ('stoma').

The mouth lining beyond the gingiva is known as oral mucosa.

The point at which mucosa and gingiva meet is known as the mucogingival line.

The gingiva is tough modified mucosa however most oral mucosa is thin, delicate and sensitive.

Gingivitis is may be sensitive or painful. The mucosal inflammation in gingivostomatitis is very painful.

Gingivostomatitis is most commonly seen in cats but is also found in dogs.

The inflammation is an altered immune response to the presence of plaque.

Immunity, genetics and concurrent disease may all have a role.

In cats, viruses may be implicated:

- FeLV – feline leukaemia virus
- FIV – feline immunodeficiency virus
- FCV – feline coronavirus

The pattern of inflammation may vary.

Individuals may show localised areas of inflammation (often worst at the back of the mouth) or generalised inflammation with all tissues near teeth affected.

Contact ulcers may form where cheek mucosa touches plaque-covered teeth.

PERIODONTAL THERAPY

Professional Treatment

Periodontal Therapy – Scale & Polish

SCALING

Refers to removal of calculus (tartar).

The below methods may be used:

- Forceps - debulk calculus; care re enamel damage! May break teeth.
- Scaler – above gum-line ('supragingival') ONLY
- Curette - supra and subgingival use (has a rounded tip)
- Power - magnetostrictive (eg cavitron) or piezoelectric (less heating)

Hand instruments (curettes and scalers) are slower than power instruments.

Forceps must be used with great care or avoided on fragile cats teeth.

Scalers are safe only to use on deposits above gum-line as they have a sharp tip ('toe') and two cutting edges.

Curettes have a rounded tip, only one cutting edge and may be inserted below the gum-line.

Power scalers may be sonic or ultrasonic. Ultrasonic scalers are most efficient.

Magnetostrictive and piezoelectric types both use the rapid vibration of the tip to dislodge calculus.

Heat is also produced, mainly by magnetostrictive types. The water cooling should form a good mist and scaler tip angled to ensure the water falls onto it.

Thermal pulp injury - power reduced (50% or less) and teeth scaled for two seconds at a time only to minimise risk.

Enamel damage – the end of the tip will damage enamel. The side edges of the tip should be used with a light, sweeping motion.

Light use at the calculus edge enables efficient tip movement and working.

POLISHING

Is used to remove plaque and remove microscopic calculus remnants, thus smooth the tooth.

Soft polishing cups enable 'flaring' which produces sub-gingival cleaning.

Polishing may also cause thermal pulpitis. These precautions help minimise this by friction reduction:

- Low speed – sufficient only to keep cup rotating while flaring.
- Light touch on tooth – enough to flare only.
- Soft cup – flares easily
- Wet 'slurry' of fine paste

Scalers cause some plaque-retentive enamel roughening. Polishing with a fine paste may help remove this.

Polishing should be directed from gum area to crown as the area of the sulcus is most important.

Paste should be thoroughly rinsed from the mouth using the air water syringe or separate syringe. Retained paste will delay healing.

Pocket Control & Periodontal Surgery

Cleaning of pockets is difficult due to their shape. Only curettes or special power-scaler tips may be used in pockets ('curettage' / 'root surface instrumentation/ debridement')- other instruments damage tissues.

Where diseased cementum from the root surface is removed we term it 'root planing'.

This may be 'closed' (instrument inserted into pocket) or 'open' (flap created to expose inside pocket).

Pockets may be reduced in some cases eg false pockets due to gingival hyperplasia.

Reduction prevents the trapping of plaque and worsening of periodontal disease.

Partial gingivectomy (or 'gingivoplasty') is a technique used to reshape and reduce the gum height.

A protective 3mm of attached gum should be left intact surrounding each tooth.

Where any abnormality is detected investigations should be used to reach a diagnosis and treatment options identified. Examples:

- Tooth fracture
- Pulp death- via wear, trauma etc
- Abscess
- Periodontitis:
 - Furcation F2-3
 - Periodontal pocket depth >5mm
 - Mobility >1
- Feline Odontoclastic Resorptive Lesions (FORLs)
- Caries
- Malocclusion-including retained deciduous dentition
- Gingivostomatitis
- Failed restorations- 'escape' treatment

Teeth affected by advanced periodontitis should be treated to prevent local and systemic spread of disease.

If left, jaw-bone loss occurs and mobility or abscessation within pockets may cause pain.

Many extractions involve the three steps of access and flap formation, tooth sectioning and extraction, socket care and closure. Specific equipment is required for each.

ACCESS & FLAP FORMATION:

- Sulcal incision & flap formation: 15blade & handle (eg no.7)
- Forceps: atraumatic Debakey, Adson-Brown
- Periosteal elevators: Goldman Fox, Shipp 2-3mm
- Retractors: gingival (Senn/ cats claw)

Teeth affected by periodontitis may be saved by advanced pocket reduction techniques including:

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

Compromised teeth with good attachment and no pocketing may be retained simply by meticulous homecare by owners.

Medication

Antibiotics

In young, healthy animals antibiotics are not required for routine dental cases.

Indications for use:

- Compromised or immune-deficient eg diabetes, FIV, organ compromise, severe infection or debilitated patients. Usually single dose only.
- Treatment delay eg tooth fracture (NB analgesics required!) Course.
- Local spread of infection eg abscess, osteitis. Course.

A single dose of broad spectrum antibiotic may be given in the pre-medication to 'mop-up' bacteraemia.

Suitable broad spectrum antibiotics include:

- Bacteraemia – rapid acting penicillin or as below
- Course – amoxicillin-clavulanate/ clindamycin/ metronidazole

Antibiotics should NOT be used as treatment for periodontal disease.

To reduce bacterial aerosol, antiseptic mouth washes should be used.

Topical Medicaments

Antiseptic mouthwashes:

- Reduce bacterial aerosol for operator
- Reduce bacteraemia
- Provide clean field for surgery
- Provide bacterial control where brushing is impossible

Chlorhexidine gluconate is most effective and provides several hours of activity.

Mouths have good blood supply and healing speed- antiseptics are unlikely to benefit healthy patients.

Flouride?

Flouride has no proven benefit for routine dentistry in animals.

Flouride is toxic and may be harmful if used.

Homecare

Homecare is the most important aspect of dental care for our pets. Since plaque reforms so quickly, a new layer is present on teeth minutes after a scale and polish within the surgery!!

It is thus essential that homecare continues the benefit of removing pathogenic bacteria everyday to maintain health and hygiene.

Homecare may consist of several aspects:

- Tooth brushing
- Chews
- Food
- Rinses
- Other??

The most effective is brushing.

Periodontal disease is caused by plaque. Effective removal of plaque will prevent or slow progression of periodontal disease. Plaque forms with any diet type and animals also suffer from this in the wild. Chews and rough diet do not provide cleaning of plaque from the gum-line and thus are not as effective as brushing. Wild animals and those fed a 'natural' diet also suffer from periodontal disease.

Some individuals are more prone to periodontal disease due to genetics, tooth-arrangement, immune status or other disease. These animals require greater homecare to remain healthy than others.

Daily tooth brushing remains the 'gold standard' of oral hygiene. The bristles mechanically sweep plaque bacteria away preventing the gradual change towards pathogenic.

It is best to start brushing when animals are young. Start by the owner touching the animals face and gradually lifting the lips. The use of animal-specific toothpaste as a treat enables touching the teeth. Approach areas which the animal is most comfortable with being touched first. Clients should be warned to protect their own safety foremost!!

Brushing teeth can take a long time to achieve; do NOT rush, go at a pace the animal is comfy with. Brushing of the teeth may take around 6wks. Try to make tooth-brushing part of you and your pet's daily regime. Eg after evening meal and before a walk or game.

Some chews are proven to remove plaque. The exercise is good for the jaws and saliva produced helps 'wash' food debris away. It is a useful and fun addition to homecare. HOWEVER remember that it will not clean beneath the gum line to prevent periodontal disease.

Chews which may be effective include:

- Raw hide
- Rubber toys
- 'Shaped', edible dental chews

Always advise owners to watch their pets during chewing to minimise risk from choking.

Plaque forms with wet or dry diets. Sticky foods may help further attachment of debris. Some fibrous, dental diets help remove plaque; their fibres disrupt the pellicle. This mechanical, plaque-removal action is much less effective than tooth brushing as it does not reach below the gum-line.

The removal of plaque from the gum-line area is essential for disease prevention!

Some dental diets contain chemicals which reduce tartar build-up by preventing mineralization of plaque. This does not reduce plaque so may not reduce periodontal disease. Foods may also use chemicals which reduce plaque formation.

Mouth rinses of chlorhexidine gluconate (non-foaming) kill microbes. They are of use in animals where brushing is not possible. Warn owners that they may stain teeth brown!

Other homecare products do not have proven efficacy.

- If there was anything better than brushing we would use it ourselves!
- If it sounds too good to be true it probably is!

Dental Clinics

Monitoring of patients is vital; most would require a dental check every 3months initially. Where oral hygiene is good this may be extended to every 6months. If other pathology exists or oral hygiene control is compromised checks may need to be more frequent than every 3months. This also helps maintain motivation of clients. A recall system similar to that with boosters is recommended.

Monitoring would initiate as an extension of first checks and vaccinations. Oral hygiene is recommended from first presentation in puppies & kittens. A first dental check at 5months old is advisable as eruption of most teeth will be apparent aiding identification of malocclusions. Checks may be combined with weighing, worming etc.