

DENTAL RADIOLOGY

Techniques and Interpretation

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Taking and interpreting dental radiographs is a skill that requires practice. In time your speed of taking them will improve-practice, practice, practice. The more radiographs you take, the quicker you will become at getting the proper positioning on the first try.

An excellent reference for interpretation dental radiographs is “Atlas of Dental Radiography in Dogs and Cats by Gregg A. DuPont and Linda J. DeBowes, published by Saunders-Elsevier. This book contains chapters on techniques, normal radiographic anatomy and pathology in both dogs and cats.

Dental Radiography Techniques

Parallel

Film parallel to tooth and root

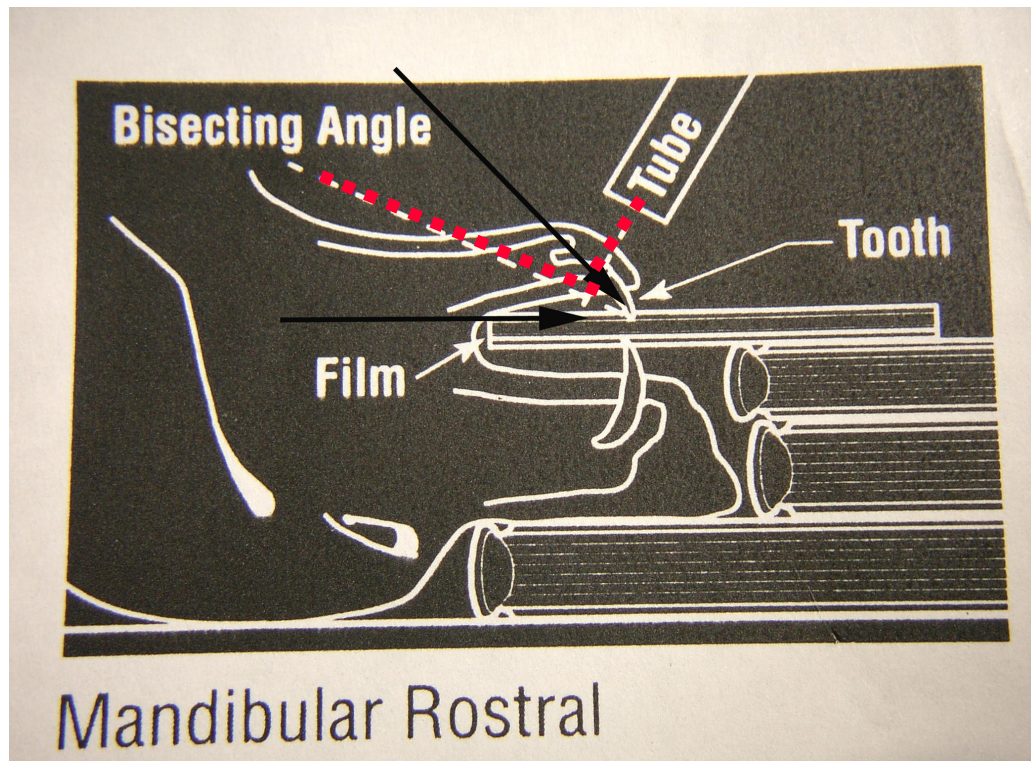
Used with mandibular premolars and molars

Film size and technique works for very small animals, especially with limb injuries

Bisecting Angle

Apply that geometry you despised in high school

Allows accurate image of incisors, canines, maxillary premolars and molars



Interpretation of dental radiographs begins with proper orientation. They should be arranged in a manner similar to the normal anatomy of the mouth. There are 2 common ways: the most common is “facing the face” in which the images are arranged as if you are looking at them from outside of the mouth. With this method the images of the left side are on the right and vice versa. The other method is “upon the tongue” in which the images are arranged as if you are sitting on the tongue, looking out.

Another factor in the interpretation of dental radiographs is being familiar with the number, normal shape, number of roots and anatomy of the teeth. Keep a dog and cat skull handy for reference as well as for client education.

The dental formula is as follows:

Dog –Deciduous-Incisors 3/3, Canines 1/1, Premolars 3/3=28

Adult- Incisors 3/3, Canines 1/1, Premolars 4/4, Molars 2/3=42

Cat-Deciduous-Incisors 3/3, Canines 1/1, Premolars 3/2=26

Adult- Incisors 3/3, Canines 1/1, Premolars 3/2, Molars 1/1=30

In general, the number of roots of dog and cat teeth are as follows:

Single Roots-incisors, canines, 1st premolars, last lower molar

Double roots-upper PM 2 and 3, lower PM 2, 3 and 4, lower M 1 and 2

Triple roots-upper PM4, upper M1 and 2

Verstraete Study: Retrospective Study-Justification for Dental Rads

Value of radiographs with clinical findings present

Conformational only Dog (24.3%) Cat (13.9%)

Additional findings Dog (**50.0%**) Cat (**53.9%**)

Clinical essential findings Dog (22.6% Cat (32.2%)

No value Dog (3.1%) Cat (0%)

Value of radiographs w/no clinical findings present

Incidental radiographic findings Dog (41.7%) Cat (4.8%)

Clinically important findings Dog (**27.8%**) Cat (**41.7%**)

No value Dog (30.5%) Cat (53.6%)

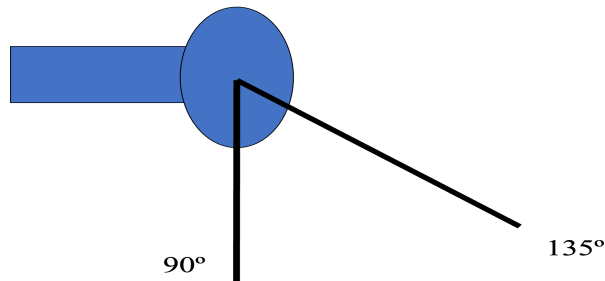
Radiation Safety

Inverse Square Law:

If “x” amount of radiation is at 1 meter then at 2 meters

it is $\frac{1}{4}x$. Six feet from the tube head is a reasonable distance to maintain

AND 90-135° from Tube head is safest to be to avoid scatter



Room entrances-be sure to set up a system to let employees know when rads are being taken and maintain the 6 foot distance.

SLOB Rule (Same Lingual Opposite Buccal):

- Used to help identify the location (buccal or lingual) of an object or lesion on a dental radiograph
- Requires 2 radiographs
- Shift tube head in 2nd shot noting the direction of shift and of the lesion
- If the lesion moves in the same direction as the tube shift it is lingual, if it moves in the opposite direction it is buccal.

Indications and Interpretation of Dental Radiographs

Attrition/Abrasion Wear-excessive wear to the crown of the tooth can lead to changes in the roots.

Fractured Teeth-Open pulp or not rads help choose treatment options

Missing/Un-erupted teeth-looking for un-erupted teeth or root tips that could become cystic or abscessed

Dentigerous Cyst-an unerupted tooth that causes cyst formation that can be very damaging to bone by cyst expansion

Radicular Cyst- cyst associated with the root of a tooth

Odontoma- Compound-organized, tooth or tooth-like structures
Complex-unorganized material
Either can be destructive

Facial/Sub-orbital Swelling-most commonly an abscessed tooth but must rule out cancer and cysts

Periapical Abscess-infection seen as lytic areas of bone at the tip of teeth

Missing teeth/retained roots-confirm entire tooth and root is missing/removed. Roots, if present can become abscessed.

Periodontal disease-evaluate bone around teeth

Supernumerary (Extra) Roots-ID their presence, especially for extractions
Supernumerary (Extra) Tooth-confirm anatomy if extracting

Dens Indente-“tooth within a tooth”-malformed tooth often become abscessed

Gemination and Fusion tooth-involves crown and root development

Convergent roots-malformed roots often lead to need for extraction

Dilacerated roots-roots with bends or turns in their anatomy-helpful to ID because they are more difficult to extract

Tooth Resorption: “aka” cervical line lesions, resorptive lesions, neck lesions, FORL-feline osteoclastic resorptive lesions

Type I-normal root structure visible

-perio or endo disease maybe present

Treatment-extract completely

Type II-root resorption

-normal root structure not visible

Treatment-crown amputation

Abnormal Roots-Concrescence-roots appear to have fused together

Enamel Hypoplasia-abnormal development of enamel, root development may be affected

Hypercementosis-over development of cementum on the root, usually appears as an enlarged, bulb at the apex of the root

Jaw Fractures-dental rads allow isolation of fracture to more easily evaluate and treat

Economics of dental radiology (prices may vary)

Assume:

5000 animals over 3 years of age

75% "need" COHAT (Complete Oral Health Assessment and Treatment)

75% of 5000 = 3750

BUT, we only do:

2 Oral COHAT's per weekday = 520 / year

Average of 2 dental rads per animal = 1040 films / year

Charge \$20 / film = \$20,800 income / year

Costs:

Dental x-ray machine	\$4,000- \$ 5,000
Digital dental software +/-computer	<u>\$6,000 - \$15,000</u>
TOTAL	\$10,000 - \$20,000

Dental X-ray Techniques

Indications:

1. Periodontal disease - any areas of gum recession, furcation exposure or gingival pockets. Extract if greater than 50% bone loss
2. Broken or worn teeth: Abrasion or attrition can cause pulp exposure without visible signs. Look for signs of root tip infection.
3. Discolored teeth: Pink, purple or gray color indicated dying or dead teeth (93% of them). Compare pulp chamber size and look for signs of root tip infection
4. Enamel defects: look for root changes-there may be deformities or periapical lucency
5. Suborbital swellings: Rule out cancer, abscess, cyst. Look for root tip infection or cystic teeth
6. Deciduous tooth extractions: confirm adult tooth present prior to extraction, also helps plan the extraction
7. "Resorptive lesions": Characterize tooth health, helps to decide extraction method – extraction vs. crown amputation
8. Oral tumors: Look for bone involvement, plan/evaluate margins.
9. Pre- and post-extraction: Help gauge difficulty of extraction and plan extraction method. Identify potentially difficult to extract teeth. Insure all roots were extracted, bone edges smooth (for better healing)
10. Missing teeth: Evaluate for un-erupted teeth (potential cysts) or retained roots (potential abscesses)
11. Oral surgery: Oral fractures or margins for oral tumor surgery
12. Full mouth series: elective service for your clients- make sure all teeth, roots and bone appear healthy
13. Small mammals, exotics-injured limbs, tails, etc.

The challenge:

For one month track the number of dental cleanings you perform as well as the number of dental x-rays you would have taken based on the above indications. Then, do the math and see how quickly you can pay for adding dental radiology to your practice.

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