

Decoding the art of taking dental x-rays

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I love hanging out in the dental corner and get a kick out of doing a beautiful set of full mouth x-rays – I know, weird but true! It is so satisfying but it can be tricky getting just that!

I am happy to share with you the tips and tricks I have learnt that save time (and swear words).

Let's start with safety first. Lead gowns, thyroid protectors and a monitor badge. As your patient is anaesthetised, you should not need gloves and often are able to move away to further reduce any exposure to yourself.

Lead lined tables and walls are a luxury that some clinics may have. I use a lead plate under the head of the patient. I also yell out X-RAY! At the top of my lungs. My dental area is close to the busy prep area, so I always make sure that I make my intentions clear and wait for other personnel to move.

Back in the dark ages, I started with dip tanks for developing and boy, did you learn fast to lock the dark room door!! Since then, thankfully, x-ray developing techniques have come a long way. They now pop up on the screen at the push of a button.

I use a Digital Radiography or DR system that has a solid sensor or plate, attached by a cord to the computer. This captures the x-ray image and immediately displays it on a computer screen. It only comes in one size.

Tip #1

Tape the cord of this plate to the table. If the plate accidentally gets knocked to the floor, it will not end well!

Computer radiography or CR uses a reusable phosphor plate or film that captures the x-ray image. This plate is then inserted into a special reader that reads the image, wipes the reusable plate and sends it to the computer screen. It is a slower process due to the processing time but still produces good, clear images. This system does have different sized plates, and the reader is designed to read all the sizes.

The thing that takes the x-rays. The tube head is where x-rays are created, while the generator is responsible for providing the power to generate the x-rays.

I use a floor mounted, wheeled generator with the tube head on an extendable arm, which some clinics will have wall mounted instead. There are also handheld generators and tube head in one. Having a tube head fixed on an arm is helpful as the angle of each shot can be assessed and reangled before taking the next, if need be.

Tip #2

When using a handheld generator, take the x-ray and continue to hold it in place until you see the resulting image. It is then easier to reangle the next take instead of assuming on the next angle.

It is so important to take dental x-rays. There is nothing nicer than a beautiful, healthy-looking mouth, all pink, shiny and clean, but what lies below? Dental radiographs are the only way to assess the health of the whole mouth. By the age of two, 70% of cats and 80% of dogs have some form of periodontal disease (National Companion Animal Study 1996; Wiggs and Lobprise 1997). Small and toy breed dogs are particularly susceptible (Hoffmann and Gaengler 1996). So, a significant portion of periodontal disease is sub gingival.

Most cases of tooth resorption (common in cats) may be under the gum line. Tooth root abscesses are hidden beneath the gumline and there may be no obvious external symptoms, therefore only detected through x-rays. Understanding normal anatomy helps to identify abnormal anatomy.

Label the x-rays as you go. Remember that the x-ray on the screen is not a mirror image. The left side of the screen is your patient's right side.

Tip #3

Keep a picture on the wall beside the computer to help orientate the x-ray on the screen while labelling.

Positioning aids. I work with the patient in lateral recumbency and x-ray half of the mouth at a time.

Place a lap sponge in the mouth and down the throat to absorb liquids during the COHAT and to wedge in behind the x-ray plate once in place, to keep it in place.

Tip #4

Place a folded hand towel to lift the head so you can more easily get the tube head at the correct angle to take the x-ray. Super helpful for the modified parallel technique on the lower incisors and upper incisors.

There are a few different techniques to get a dental radiography series:

- **Parallel technique:** The plate is placed parallel to the roots of the teeth. The tube head is then aimed at a right angle or 90-degrees and held as close as possible to the plate. The resulting image is distortion free.
- **Modified parallel technique:** Occasionally used for anterior teeth (incisors and canines) but usually requires slight angling of the x-ray beam.
- **Bisecting angle technique:** The x-ray plate is placed at a right angle to the roots of the tooth. Imagine what this angle looks like, of plate and roots – not crown, and then visualize a line that dissects the first angle equally into two. The x-ray tube head is directed perpendicular to this line that you just imagined, the bisector line of the angle. This helps minimize distortion and ensures the image captured is accurate.

Tip #5

When placing the plate in preparation to use the bisecting angle technique or simplified technique, the tip of the crown of the tooth should sit on the buccal edge of the plate.

Simplified technique: This is my choice if I can't use the parallel or modified parallel, I use this method. Aim the tube head at a 45-degree angle to a correctly placed plate, you will get a readable x-ray. Try it and see! You can then adjust the tube head angle slightly less or more if the length of root is not quite right.

Tip #6

Develop your own method when working through a series of dental x-rays. Always start in the same place and work your way round the mouth in sequence.

I start with the left mandible, 309, 310, 311 (molars) in dogs, using the parallel technique because this is the easiest view to get a win! Sometimes imaging the root of 311, 411 (molars) can be problematic, especially in very small dogs as there is not a lot of room in there for a size two plate.

Tip #7

Set up for a parallel technique of the above area, distally shift the tube head slightly closer to the dog's cheek to more easily image the entirety of 311, 411 (molars).

The parallel technique works well for the cat lower jaw too.

Tip #8

When x-raying lower premolars in cats, it can be easy to cut off the tip of the root of 307, 407 (premolar). Use the parallel technique and place the plate in the mouth between mandible and tongue. Use the lap sponge to hold in place but also wedge it behind the outermost corner of the plate, pushing it towards the mandible slightly and this new angle of the plate allows the whole root of the first premolar tooth to be included in the image.

Continue working along the jawline, I can get 308, 307 (premolars) on another parallel shot then 306, 305 (premolars) on a bisecting angle/simplified. 301, 302, 303, 304 and 401, 402, 403, 404 (lower canines and incisors) on smaller dogs and cats can often fit on one x-ray using the modified parallel technique or for larger dogs, break it down to 304,404 roots on one x-ray then the incisors on the next.

Tip #9

Leave the tongue in place when taking the lower canine/incisors shot, place the sensor and pack it well with the lap sponge. I used to use a rubber band to hold the plate in place when taking this shot and it worked well, it just may mask some pathology as it is distinguishable on the resulting x-ray.

Once the lower jaw is complete, I begin again on the molars of the upper jaw. The plate is placed parallel to the palate. Using the simplified technique, the tube head is positioned at a 45-degree angle to the plate. This is now where cats and dogs differ. When taking x-rays of the maxillary cheek teeth in the cat, the zygomatic arch overlays the roots of the third and fourth premolars as well as the first molar. If this is an issue, then there are two other ways to get the x-ray with minimal interference.

Extra oral: place the plate on the bench and lay the patients head on the sensor with the area to be imaged placed down over the plate. The beam is angled through the open mouth using the bisecting angle technique. This image needs to be labelled accordingly as it is extraoral and may be mistaken for intraoral.

Modified parallel: place the plate across the open mouth resting the back of the plate against the inside of the lower canine and the lingual aspect of the lower cheek teeth. The tube head is angled slightly less than 90-degrees to produce an image with less interference from the zygomatic arch.

The upper maxilla premolar four, 108, 208 in dogs has three roots and often the mesial roots overlay each other. A distal shift of the tube head will separate the mesial roots for individual identification.

Keeping the plate against the palate, slide it forward to encompass the three premolars and use the 45-degree, simplified technique. This shot often includes the apex of the canine but ideally you would image the canine as a whole or in two x-rays as crown/root in very large dogs. Upper incisors are imaged using the modified parallel.

Tip #10

Loosen the ties of the endotracheal tube to allow more room for the plate.

Trouble shooting. There aren't too many things that can go wrong.

Cone cut – this is when the image has a white area on it and is rectified by adjusting the angle of the tube head to cover the entire plate.

Under exposure/over exposure - The settings for correct exposure often are predetermined by the generator or can be adjusted manually for small/large or cat/dog. There are many different systems, and each operator will get to know their own machine.

Plate upside down – self-explanatory.

Image not the desired area – reposition plate.

Tip #11

Give it a go!

Take that x-ray! If it is not right, change the angle or reposition the plate, one or the other, and take it again. You'll make mistakes and maybe waste a few films or pixels but that's all part of the learning and it is necessary to build your confidence. Every good x-ray is a win.

Incidental findings are quite fun. That tooth with an accessory root, the Burmese cat with an accessory tooth, a calcification spot that if there were no pre-extraction x-rays, looks like a bit of root left behind. The bone loss from periodontal disease, the halo effect of abscess, dead teeth, broken teeth and broken roots or even a dentigerous cyst from an unerupted adult tooth, are what we are looking for to be able to make our patients as comfortable as possible.

References

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