

Dr. Bob Wood - Dental Radiography: Tools of the Trade - Episode 3

Dr. O'Keefe: Welcome back, Dr Bob Wood of Toronto for the latest episode in our series on the systematic approach to radiological interpretation. And today Bob, we're going to talk about the tools of the trade.

New Speaker: Correct.

Dr. O'Keefe: How to use them, how to recognize what are the best ones, and I'm just using the right tools correctly. Why is this so important to me as a GP?

New Speaker: Well, I think that the reason it's so important to general practitioners, and in fact every practitioner, is that we, we are, we tend to go into this, on our autopilot with radiographs. Give me a pan, get me a PA, get me a bitewing and we don't, we don't pay attention to our film selection criteria. Do our films cover the entire area of interest? Are they good films? Are we content to use bad instruments? I mean if you're doing a restoration, are you content to use a plugger say that's caked with Amalgam, that that has been built into a ground ball?

Dr. Wood: I mean, we want to use good instruments and so we want our radiographs to be good instruments. We want to choose the instruments we need, by which I mean the right number of films to cover the area. We don't want to go overboard with technology that we may not need, that we, we might be perfectly satisfactory to have a good single planer image rather than a cone beam CT, or there might be the time we're going to have to go to quite advanced imaging. So, we want to have the right quantity and type and then we'll look at those images they have to be the appropriate quality, the right contrast, the right density, the right patient positioning. There's so much that you can do wrong. And I think dentists probably should do more retakes on their films and if they're not taking the radiographs themselves, train their staff to do very high-quality images.

Dr. Wood: I think that's critical and I think too often we just say, well, you know what, it's good enough for what I need.

Dr. O'Keefe: Right. So, let's go and have a look at your presentation.

New Speaker: Sure.

New Speaker: So, if we think of the tools of the trade, one thing that we want to work with is, we want to work with optimum information and for radiographs, that's: do we have enough for the good quality, are we content with them? And that starts when the patient opens their mouth and you start taking a history and clinical examination so, and it ends with hopefully really, really high-quality radiographs that show all of the area that you need to make your clinical decision making.

So, if we think about that, as I said, it always starts with the history and I see a lot of, you know, with my work at the coroner's office, I see thousands of dental charts and I see mostly the dental charts have a history questionnaire, which is fine.

Dr. Wood: But I think when you're doing a history, when you're with a patient that has a specific problem, I think it's really, there's two things you have to remember that I think it's a good idea to take your mask off. Most people when you're doing the history and also to swing your chair in front of the patient and ask the questions and see how they react and how they answer them and actively listen and ask other questions relating to their answers. I think too often we concentrate on completing a history form as opposed to getting the clinical information, historical information about the chief complaint from a patient. I think we spend too much, you know, tick, tick, tick, tick, tick. Do you feel hot in a warm room or what does that mean? I think it's, you know, I think that you need meaningful questions.

Dr. Wood: You should do a clinical exam examination. I always say to people, you should use every sense, but your sense of taste when doing a clinical examination. I had a patient yesterday with radiation necrosis. I knew as soon as I looked in his mouth i could smell the radiation necrosis and I didn't put my nose in his mouth. You could smell it far enough away, but it is useful to use every sense, but especially your common sense. And I think a lot of us leave that on the door, unfortunately, with respect to our diagnostic functions. So, when we get our radiographs we're eager to look at them and find the decay or the periodontal disease or the periapical; but that's really we should be saying, oh, what did these tools look like that I'm going to later use for radiologic interpretation? In other words, we have to look at these radiographs as they come out of the process or as they come up on our computer screen and say, are these good enough tools to do the job that I want or that I may need to do, which is to interpret the radiographs to reach a conclusion?

Dr. Wood: So, it really is divided into two parts, quality of the images and quantity of the images. In other words, are the images, are they adequate or actually are they fantastic? And, do I have enough of them? i.e. have I covered the area of interest? Have I got enough to give me the area of interest? It's no good to have a picture of 10% of something when you know there's another 90% that you're going to be responsible for that isn't depicted on your radiograph. So, if we look at quantity first, that's what you want to ask. Does the image set that I have cover the area of interest or do I need more images? Have I got enough to tell me what I need to know or do I not.?So, if we look at a set of bitewings, we can see that you know, they're not great bitewings but we can see some, they're very old too, they're a year apart taken.

Dr. Wood: They're six months apart rather, and there's been some work done and you know, but if we pay attention to the lower left, we can see that there's something that has been there for six months that was never picked up. And so if we look at another image of the same area, well this is now a whole other kettle of fish because this person has a benign odontogenic tumor. So, this was there for quite a while and it wasn't seen or as my mentors Doug Stoneman and Mike Pharoah used to say, did you say you didn't see it or did you not observe it? So, it was there to be seen, but it was not observed. So, if you don't have an adequate coverage of the area of interest, you're not going to make those observations.

Dr. Wood: I remember we talked before about looking at the corners of the film and we're going to talk about how to look at individual films in the next segment. But this is now better coverage, not complete coverage of this, but it now tells us that, oh dear, we've been like, we've been missing this. And sometimes, it'll depend on what you want to know as whether this is adequate coverage. So, this is a patient who had external resorption from a third molar on the back of the posterior aspect of the second molar. For the purposes of treating a second molar, it's probably adequate, but let's say if we're going to take out the third molar as well, I'd really like to know what's going on with the apical bit of the third molar; I've been burned too many times.

Dr. Wood: I'm a wet finger dentist, I've been burned too many times by finding things that I really don't want to find. There's no good surprises in a situation like that. So, you know, sometimes if we're talking about this film, this is Oh I can figure out what I need to figure out from here. But if I was taking that out, I certainly want more images. And, sometimes the images or not images that general practitioners generally do. This gentleman came in because he had crooked teeth and he had an open bite and there was some talk about doing some orthodontics on him and perhaps more things after surgery. We have a cone beam CT have been done and you can see this large soft tissue mass and this represents the airway and there's not much of an airway at this level.

Dr. Wood: He later went on to have a CT and MR which showed very, very large benign tumor occluding his airway. So, in this case, we really needed to take it to the level of CT and MR and most cases in general practice, obviously you don't need to do that, but you do need to have to ask yourself the question, do I have adequate quantity and can I deliver on the quantity I need because dentists don't have MRs and CTs like they do in hospitals. So, if you don't, then you're going to have to refer to a maxillofacial radiologist.

Dr. O'Keefe: Was that tumor visible visually?

Dr. Wood: No. If you had a real run at it, you can see it, but it was, it tended to be largely, that's about 10% of the tumor that you see there. It goes very far back.

Dr. Wood: You can see it on a lateral reconstruction of the cone beam; in any case, it went all the way up to the base of the skull into the skull, so it's certainly something that is now going to be addressed by a tertiary care hospital, not orthognathic surgery or orthodontics because that is not, you know, it's "pants first, then shoes", if you'd treated that with orthodontics and oral surgery, but you would have done harm to the patient and I believe it was either the orthodontist or the oral surgeon that picked up the fact that initially this patient, you know, this is obviously there's something going on here; made a referral to a physician and it went from there. Sometimes, you should ask yourself, well, do I need more imaging, or do I need less imaging. You want to image wisely.

Dr. Wood: We accept the linear hypothesis even though there's really no science for the low-end, low-dose part, we're going to accept that. And so in a case like this, we can see this is the panoramic image is just an image enlargement of the lateral incisor, and we can see that there's a periapical radiolucency; this patient is an oncology patient, we're going to send him to an endodontic colleague and they're going to take their own films. I can divine what's going on here from a clinical examination history and this radiograph and know enough that I'm going to send it for the root canal specialist who is undoubtedly going to take his own radiographs. So, I have enough. I do not in this case, have to do even a periapical survey, don't need to do a cone beam CT. It's overkill. So, It's overuse of images. So, that is using less images. Can I make my diagnosis or my interpretation on the images I have?

New Speaker: Then, we have to ask yourself, that's quantity, that's the coverage and you know, just getting it right. Then we have to ask yourselves about the quality, really the quality of my exam, the quality of the images. Would these be Images. I'd be happy to show my mom or happy to have someone look at it in a peer review process and to be quite honestly, I gathered all these images from our image set from last week and there were tons of errors in them, which is, you know, it's good to do a periodic review. And this film here, for example, this person has had surgery for malignant tumor on their left side, you can see the surgical clips with the with [inaudible] surgical clips in and out of the focal trough.

Dr. Wood: And there's something here at this point. We can't see the [inaudible] heads and the chin is tipped up too far. So, this is an error in positioning on the panoramic film and it's usable for the purpose that we need, but it's not ideal; and we want ideal instruments when we're doing our radiologic interpretation. This is another one from the hall of shame of the hospital here that we have where the patient's tongue wasn't on the roof of their mouth. So, they have this apparently large lytic area in the maxilla, but it's inadequate to use for diagnostic purposes because there's information I need to know. Is there a root tip there? I don't know. If there's a root tip there and there's rarefying osteitis

there, there's caries there. This is someone that needs a better radiograph than this.

New Speaker: As is this person. This person has radiation necrosis right here in this area here, there's sequestra and there's some bone destruction and there's some loss of the superior cortex and there's even some loss in the inferior cortex, but it's just not a nice image. You can see that they're out of the focal trough here. Again, we've got problems with probably a little bit too dark for this patient, but it's just not a good image. Why use a bad instrument? And, it isn't limited to digital or analog; this is a digital image that's been enhanced to the point where it's almost looks like a caricature of a panoramic image. You can do bad images with film and you can do bad images with a digital unit. It's up to you to decide, you know, are you happy but this is, I'm not happy with this. We've got our artifact over top of the first molar and this is a patient who's had cancer and we have to make some decisions about the treatment and why would we use a lousy image to do that? Just doesn't make sense. So, that's that.

New Speaker: And, then we can get into issues around, around some things we can control and not control. One is the image light enough, too light or too dark, like Goldilocks and the three bears. This is, if you consider this a not a bad image, it's [inaudible], everything's looks nice, the teeth are in the focal trough. We can make some judgements about what other films we want to take. But then if this film was this film, this would be far too bright, there's not enough density there to make the decisions that we might need to make, although curiously enough we're going to actually see the periapical pathosis that's going on here, somewhat better on the bright film.

Dr. Wood: And sometimes you may want a brighter film or a darker film. Now, it just depends on what your exam is for. This is a dense image of the same patient. So, this is a much higher density, higher degree of darkness, and it's too dark to make decisions, good decisions on. Conversely, contrastly, we have issues with contrast, so it's density and contrast. So, contrast is: I like to conceptualize as this short scale or long scale. Short scale means there's not a lot of steps between the darkest part of your film and the lightest part of your film. So, it looks contrasty. If you think of a silhouette piece of art that's maximum contrast, black and white, that's as contrasty as you get. And, you may want more contrast for certain images or for certain examinations that you might not, and you can have a low contrast image where, you know, everything sort of looks washed out.

Dr. Wood: And some of this is under your control, there's some things that are not under your control. Subject contrast: your patient, if you have a fatter patient, you're going to have a lighter film, and this would make allowances for it. So, there's certain subject things that come into play. Using film there's certainly some things with the handling of film, it can mess up density and contrast, but we

want good instruments. So, we are going to examine our films and see are these films good instruments or are these films lousy instruments and do I need to retake them because using a bad image is; if it's really bad like some of these were, is worse than using no image at all. You know, if you haven't got the area of interest and you and your image quality is terrible, you're better to do it.

Dr. Wood: It's like you want to use the surgery now. It's just like say, well, you know, I took the right side of the tooth off, I took the front of the tooth out because you know, that's okay. Probably heal over, you know, maybe you know, I see a lot of images where there's, you know, there hasn't been that much attention paid to the quality of the tool on the way out. So, you're going to get these images and then you've now decided, we've justified doing the image set to the patient and radiation biology standpoint. We've looked at the films they have, in our mind, they're adequate for what we need. So, what's next? And what's next most of the time in clinical dental practice radiology, is that we are, whether we like it or not, we're unit taskers, but we are pulled into the vortex of multitasking.

Dr. Wood: You know what's the order this week, Mrs. Smith is out there going out of her mind because you're 15 minutes late, you know, your wife has served to your divorce papers and then they turn the lights on high and shove a film in your hand, a panoramic and you pulled it up to the light and you look, and you're waiting for God to tell you the answer, he's not going to tell you the answer. We have to stop that. Think of it: if you were doing anything else in any act in dentistry, you put a 150,000-rpm drill in someone's mouth then start reading the paper or you know, talk to someone else about something else or maybe put another patient and have one drill in each hand. It can't be like that. We have to focus on the task at hand and the task at hand after we've decided now that we've covered the area of interest and our film is good enough quality to undertake the task that we're going to do.

Dr. Wood: Now we have to focus. You have to focus and we have to systematically look at these films that I'm going to talk about bite wings and I'm going to talk about a periapical films and panoramic films to start and then we'll move on into advanced imaging with my colleague Dr. Chadwick who will talk about looking at some pretty complex imaging and the principles are more or less the same in both. So, that is what's to come. What's to come is now we'll start, unfortunately, this may seem like a snail's pace to your viewers, but we've got to go through these steps now we're going to say, okay, if I have a patient with a toothache who's coming, what films do I take? And I've got the films and where am I going to look? Where am I going to look, what I'm going to look for?

Dr. Wood: So, we're going to use case examples to show where your eye should always track. And There are studies that show eye tracking of radiologists and some of them are interestingly on chest films where they realize they don't actually look at like 50% of the lung fields. They only focus their eyes in a specific direction.

So, that's to come. How are we going to always look at all the films the same way?

New Speaker:

Well, we're certainly looking forward to those next episodes where you get into the practical recognition of different aspects of different types of films.