PRACTICAL DIGITAL RADIOGRAPHY, FLUOROSCOPY AND CLINICAL / FORENSIC PHOTOGRAPHY IN PRACTICE

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Fluoroscopy

Fluoroscopy has been used commonly since the 1950s and is now ubiquitous in airport security. In veterinary medicine it allows us to radiographically assess the animal while still conscious. The classic use in vet medicine is for observing things such as diaphragmatic hernias, tracheal collapse, and megoeosophagus. The main advantage of fluoroscopy is speed. The disadvantages are lack of fine detail and recording the image can be tedious.

The uses I have found for fluoroscopy specifically for exotic medicine are:
- Chelonia pre-hibernation assessment – checks for eggs, bladder stones, foreign objects.
- Egg retention in various species.
- Presence of heavy metal - monitoring heavy metal particles been passed, location of lead pellets / shot in conscious animals.
- Assessment of degree of peristalsis of rabbits.
- Looking for fluid lines.
- Obvious fractures.

Digital radiography

Many practices have already moved to digital radiography. The main advantages compared to using film are speed, it is more environmentally friendly (no chemicals are needed), the ability to send images electronically for second opinions, less storage space needed and cheaper running costs.

Disadvantages: Initial capital outlay is higher than a film system, some lack of fine detail compared to good quality high definition film such as mammography film unless one uses specialist digital dental plates.

Digital radiographs are taken as a DICOM file. Wikipedia defines this as: *Digital Imaging and Communications in Medicine* and is a standard for handling, storing, printing, and transmitting information in medical imaging. It includes a file format definition and a network communications protocol.

For radiography in reptiles it is vital that you can take images of horizontal projection as they lack a diaphragm.

Photography in practice

I use photography for court reports, client records and for marketing.

Forensic photographs benefit from clear identifying labels ideally printed in a font size appropriate to the size of the area being photographed. I record the RSPCA / Police / Council reference and the date the photographs were taken.

Reports using photographs should have a statement such as "All photographs with this report were taken and printed by Alan Humphreys and I confirm they are true representations of the subject".

The photographs are introduced in the statement as "Exhibit Vets Initials 2 photographs Numbers 1 to _" e.g. for four photographs and me it would be "AH2 Photographs 1 to 4".   AH2 because my clinical notes would be identified in the statement as Exhibit AH1. The individual photographs are identified with an indelible pen as AH2 Photograph 1, AH 2 Photograph 2 etc.

Digital cameras come as lens integral to the camera body or camera bodies to which different lenses can be added. Sony now makes a camera with an image stabilising system built into the camera body and different lenses can be used with this. Other manufactures have an image stabilisation built into the lenses but it makes the lenses more expensive. I do not use image stabilising lens for clinical work.

The images should have as much detail as possible. The greater the depth of field the more detail you will have. Depth of field is measured using Av (Aperture value in f stop numbers) f/2.0 gives a small depth of field f/32 gives high depth of field.

Automatic programmes will rarely give you the type of image needed for clinical photography so you need a digital camera with a manual override. The automatic programs will default to a smaller f-number and you will lose depth of field and detail

To avoid camera shake do not use a shutter speed Tv value of less than 1/80 second or you must use a tripod. Typically your subject is not going to stay still so I set my camera to manual operation and use a shutter speed of Tv 1/100 of a second depth or faster and a depth of field f/16 to f/22. You will invariably need a flash. An external flash delivers more light than a built-in flash system.

You will get better results if you increase the camera sensor plate sensitivity by increasing the ISO speed number. A low ISO speed e.g. 100 ISO will give fine detail images but it needs a lot of light and high ISO e.g. 3000 will need less light but give you a grainy texture to your image. A happy medium is to use ISO 400 to 1000.

It is important to be able to take close-up photographs of the subject. This can be done with a suitable macro lens or by using the macro lens icon on the camera's menu, normally a tulip-like symbol. It is also very useful to have a lens which gives you a wider angle of view so you can take an image of the whole subject while standing quite close to it. A very useful lens for this is a 17 to 40 mm lens.

Digital images can be taken as JPG files (these are compressed files so there will be loss of detail; comes as small medium and large settings on the camera) or RAW digital files; these have no little or no compression. The RAW files can be set as RAW, mRAW or sRAW. Always try to use the largest digital files. I set my camera to take RAW and medium JPG. This allows me to isolate a section of the RAW image so the lesion can be seen more clearly but without much loss of detail. Zooming in to a section of a JPG image will lose more detail. If your camera will only do JPG always set it for the largest JPG files.

I find it useful to have a camera that will take video as well as photographs. When ever possible use a tripod when doing video.

A good image encourages bodies such as Councils, police and RSPCA to use you rather than another practice and is a significant asset in my own practice.

You will get better images with better equipment but the costs and benefits need to be balanced out. Photographic equipment is a business expense and the VAT can be claimed back.

Top Tips

1. Set your camera so it cannot take photographs unless there is a digital storage card.
2. Review your photographs while taking them to ensure you have taken the right views. Ideally use a standard protocol to ensure you do not miss things.
3. Take lots of images, use different settings, review while you are taking them.
4. Store multiple copies, ideally on a separate hard drive to your PC and in the "cloud", and/or on CD, but only have numerical identification of the image i.e. nothing that can identify a person or address. I keep one copy on a large external hard drive and one on *Dropbox* a (an internet "cloud" storage service).
5. Have memory cards of at least 4 GB each and have at least 3 that work at all times.
6. Always take lots of images.