



Clinical photography: A picture can tell a thousand words

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We've all heard the expression "a picture can tell a thousand words" and in dentistry, photography can be a vital and rewarding part of practise.

We have seen an explosion in the use of photography due to the advent of digital cameras and their ease of use and economic advantages.

In the 90s, there was the rapid introduction of the intra-oral camera. It was the ability to show patients their dental problems "tooth-by-tooth" that led to the rapid utilization of this technology. Part of the problem was this feature of only being able to show 1-2 teeth at a time and the low resolution of subsequent picture reproduction. The next generation of digital photography is easy to use, has excellent resolution and good lighting. It is also one of the least expensive technologies today and is an invaluable tool in education and marketing to our patients.

Benefits of Photography

The benefits of photography are include:

- Improved patient communication: being able to show the patient what is in their mouths is a huge advantage compared to trying to describe their problem with words. By letting patients see what is in their mouth, they can co-examine and participate in their diagnosis. They can then see what dental problems they have and understand the need for treatment. (Fig 1.)



Fig 1: Over-eruption of teeth



Fig 2: Laboratory communication: use of shade guides conveyed in photo to laboratory

- Laboratory communication: well exposed clinical photographs can effectively communicate the optical characteristics of teeth and can show the shape, surface, morphology, value, shade, translucency and chroma. It was customary for ceramists to take a shade in person and convey that to pen and paper. Then at some later stage trying to interpret what they wrote down when building the crown is difficult and can be frustrating for both dentist and ceramist when colour matches are incorrect. Being able to access the images at any time makes the task of matching crowns, veneers, etc, a much easier one and can only improve the final result for both dentist and ceramist. (Fig 2.)

- Diagnostic tool and treatment planning aid: being able to see images of a patient and the ability to magnify pictures enable the clinician to sometimes see what they may have missed in their clinical exam. The ability to look at images of patients, records and diagnostic models after they have long left the practice gives the clinician the ability to treatment plan the patient as if they had patient sitting in the chair.

- Marketing - Library of before and after images: Being able to show photos

of patients that have undergone treatment is both an educational and a powerful marketing tool. Even better is if these images are of your own patients and your own dentistry.



Fig 3: Before and after: Gingival recontouring and porcelain veneers.



Fig 4: Composite resin restoration before and after.

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- Medico-legal considerations: Unfortunately with the increasing litigation that is evident in dentistry and our community, it is advantageous to have photographic records of patients pre-treatment, during and post-treatment. This is an invaluable record of the patient that can be used as evidence in the event of litigation.
- Self-improvement: documenting your cases allows you to critique your own dentistry and help you improve.

Components of the camera

Lens

Many 35mm zoom lenses have “macro” settings which allow you to focus close-up, but not nearly as close as you need for clinical photography. In order to focus very closely, you need a true macro lens. A true macro lens allows you to focus down to a 1:1 magnification - this works out to be an area approximately 3cm wide.



Fig 5: Canon 10D camera with 100mm macro lens and MR-14 EX ring flash.

Intra-oral photography needs a fair amount of working distance and distortion-free headshots. A macro lens in the range of 90-105mm is ideal. This focal range is also perfect for taking photos up to head size.

Flash

There are different types of flash available and these are point, ring and dual point flashes.

The point flash is a directional flash and offers more natural lighting with increased shadows and more depth and contrast. These shadows help your eye see 3-dimensional depth and surface texture.

The **ring flash** (Figure 5) is a circular flash that encircles the lens barrel and fires in all directions. This gives an even distribution of light with fewer shadows but less contrast and depth. The images from ring flashes have more of a flat even look to them. The ring flash is extremely useful for photographing areas where access is difficult and where uniform illumination is required, e.g. occlusal and posterior photos.

Dual point flash: Can you get better anterior shots with this flash? Yes, because it has the ability to change the angle of the flash, it reduces reflection, and can give



Fig 6: Canon 10D with 100mm macro lens and dual point flash (MT-24 EX)

you better depth and capture more texture and form.

It is a little more difficult to get as good a posterior shot. It is also not as easy to stay consistent, because of the many ways to manipulate the twin flash -you need to set up a system for yourself to take particular shots in certain positions while the ring flash stays put in the same position all the time.

Camera Body

This body can be for a film based or digital camera. In SLR models, the digital body appears to be similar to a film-based camera. The major difference between digital and film (analog) images are the method of capture, process, and storage. With conventional photography, the image is exposed in the camera, developed in a photo lab and stored on a celluloid strip. With a digital-based camera, the image is electronically captured and storage of images are via a recording media like compact flash or smart media cards. For example a 1GB card can allow you to capture over 400 high-resolution images before you have to download to the computer.

So what are the advantages of going digital?

1. There is an instant image which can be reviewed and if not appropriate retaken;
2. No film, so no need to buy and stock film. There is also no processing and no associated costs;
3. Environmental friendliness: no wasteful and harmful processing chemicals used;
4. Images are available to import to other applications e.g. PowerPoint, Word, Practice management software, dental imaging software. Film will need to be scanned before this can be used;
5. Duplicates can be easily prepared,

printed and forwarded to other colleagues, like ceramists or other dental practitioners; and

6. Editing opportunity: Images can be quickly and easily edited. E.g. lighting, over/underexposure can be somewhat corrected, cropping images, etc.

So now we understand that a clinical digital camera for dental use is a must in any dental practice, what camera should you choose?

The best choice is a single lens reflex (SLR) camera with a 90-115mm macro lens and a dual point flash or ring flash. The flash should be colour neutral with a colour temperature of 5500K (the equivalent of daylight). Some examples are the Canon 10D, Canon 20D, Fuji S2, Nikon D70, Nikon D100 and Olympus c4040. All of these cameras are of good quality and design and it is up to the individual to see what is the appropriate camera for them in terms of functionality, ease of use, and cost.

My current camera setup is a digital Canon 10D with a 100mm Macro lens and a Canon MR-14 EX ring flash with the storage media being a compact flash card. This camera represents excellent value, is easy to use without too much fiddling and gives an excellent picture. It is a favourite amongst dentists looking for a great clinical camera.

Integration into software

So now we have the images, what do we do with them? The digital images are transferred from your storage media, e.g. compact flash card and stored in your computer software. This can be stored in a specialty dental computer packages like Dentrix, CygnusMedia, PracticeWorks, OASiS, etc. The other way is to store them in image storage software like ACDsee or Adobe programs. It is a very easy process to load the images from your storage media to your computer and only takes a few moments and can be easily delegated to staff.

Once the images are loaded onto the software, most of these packages allow you to do minor editing to the images, such as cropping, rotating, or lightening or darkening the images.

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Clinical Hints

Retractors



Fig 7: Plastic cheek retractors



Fig 8: Plastic occlusal retractors

Plastic is favoured over metal since there is minimal reflection off plastic retractors. It is also preferable to have clear plastic retractors that can be autoclaved safely.

There are cheek retractors that retract the cheeks and there are also occlusal retractors that retract the lips and labial sulcus for occlusal shots.

The author prefers manual retractors that are controlled by the patient. It is preferable for the patient to hold these, as they will apply retraction that is appropriate without the retractors being stretched too far as can be done by a staff member.

Mirrors



Figure 9: Rhodium-coated adult occlusal mirror

These are necessary for occlusal shots and certain lateral shots. They come in different shapes and sizes. The best surfaces for mirrors are rhodium coated and made of glass.

One of the problems with the use of mirrors intra-orally is their tendency to fog up. To prevent this from happening either the mirrors can be warmed up or an assistant can blow air from a triplex syringe over the mirror to prevent condensation appearing.

Backgrounds



Fig 10 & 11 (right): Contrasters and in use: Note incisal translucency and dentinal lobing



Extra-Oral: Can be used to frame extra-oral shots and different colours can highlight patient's faces and skin tones. This can be as simple as a painted wall colour to different backgrounds that can be specifically purchased for this purpose.

Intra-Oral: Black backgrounds can allow better contrasts and allow the translucency of teeth and restorations to be displayed. Examples of these backgrounds are the "Contrasters" available from Photomed (www.photomed.net).

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Nice Image – whose is it?

Digital photography means an explosion of images are being published everywhere. Low cost of printing and publication are bringing about issues that did not significantly exist 10 years ago.

Clearly, if one records a digital image of a patient, issues of privacy and even copyright are at issue.

The digital images we record are part of the patient record. The same rules apply to these as to any parts of the dental record.

So, if one records for example, a full-face picture of a patient, then the patient might reasonably assume that that image would be accessible to them and it would be kept and used only as a record.

If you then publish that image on the internet or in a print or television advertisement for example, then you should be sure to get a signed "release" from the patient to the effect that they expressly understand what you wish to do with the image and that they release you from the duty you have to them in terms of privacy and confidence in relation to that image or those images.

The issues would seem to be that if the image could be readily identified as one of a particular person, then detection of the breach of your duty of privacy would be more likely.

Simply cropping the picture or pixellating may not be enough if the patient could identify the image as one of them.

It is therefore prudent to ask all patients for permission to use any extra oral images. Even if you are going to send it to colleagues, you should be sure to explain to the patient the reason you are taking the image. You might also have a practice statement to this effect.

Another issue is using other generic images or other photographer's images.

The various dental regulatory bodies have demonstrated a propensity to use a misleading and deceptive conduct type of action against dentists who use photographs they did not actually take and/or of work they did not actually perform.

The assumed situation is that if you use an image of some dental work (a before and after would seem to be most likely to attract attention) then it is implied that you actually performed the work. If you cannot prove that you did the work, then it can be alleged that this is unacceptable professional conduct.

Finally, if you are going to use someone else's work to help promote your work or practice then you need to ask for their permission.

In these matters, the answer to what you should do is simply to think about how you would feel in the circumstances. If you had some cosmetic procedure performed and then had your picture all over the back of a bus or in a dental magazine - how would you feel?

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What photographs do you need?

The American Academy of Cosmetic Dentistry has an excellent series of photographs that are useful for most images in dentistry and for a more detailed view of this series, the author recommends that this guide be looked at.

All images should exhibit little or no saliva and should be free of other distracting effects, e.g. fingers. It is best to take photos before any treatment is begun like impressions, scaling, occlusal articulation, etc.

Images taken in dentistry can be full-face images, retracted and non-retracted smiles and occlusal shots.



Full Face: Shot at the same level as the patient and should cover their whole head. This vertical angle is important for majority of the images taken in dental photography. The interpupillary line and long axis of teeth is used to align the camera.



Full Smile: A non-retracted natural smile should be taken. The incisal plane of the upper teeth should be in the middle of the image.

References:

1. Reality: The Information Source for Esthetic Dentistry. Miller M. Houston 2004. Vol 18.
2. Digital and Conventional Dental Photography. I. Ahmad. Quintessence 2004.
3. A Guide to Accreditation Photography: The American Academy of Cosmetic Dentistry.



Full Smile - Right and left lateral view: These views show the lips as well as the teeth visible for these angles.



The upper lateral incisor is centred on the slide. The contralateral central incisor should be visible and possibly the lateral incisor and canine.



Upper and Lower Teeth Frontal Retracted View: Teeth are slightly parted so the incisal edges are visible. The midline of the face should be in the centre of the picture and the occlusal plane in the centre horizontally.



Upper and Lower Right and Left Lateral Retracted View: The image is centred on the lateral incisor so that it is in the centre of the picture. The retractor is pulled to the side that the picture is being taken of, while the contralateral retractor is loosely held.



Upper Arch Occlusal Retracted View: This is a reflected view from a high quality mirror, with as many teeth as possible included. Keep mirror clear of fogging. The mouth should be opened as wide as possible to allow the best mirror position.



Lower Arch Occlusal Retracted View (use mirror): This is exactly the same as with the upper teeth but the patient needs to be asked to keep their tongue back so that it does not obscure the teeth.

Conclusions

With the advent of digital cameras, photography has become an easy and accessible way of educating and documenting our patients. The benefits of photography within the dental practice is numerous and it is an essential part of today's more visually focused patients who need us to not only show what problems there are but to also show what the final results may look like with cosmetic imaging or before and after images of similar cases.

The choice of camera can be either film based or digital, but with the advantages that digital photography offers, it makes good sense to explore this avenue.

It is one of the least expensive technologies that dentists can buy and is worth much more in terms of better treatment planning, documentation of cases and importantly educating and presentation of treatment to our patients.

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