Clinical dental photography: part 1

The first of this two-part series aims to cover the equipment required as well as the common settings used to capture reproducible clinical images of our dental patients.

Introduction

Photography is becoming an increasingly vital part of daily clinical practice. It enables us to create a time-capsulised visual record of our patients' oral status, and aids in the communication of diagnoses and various treatment modalities. It strengthens the medicolegal documentation of intra-operative procedural findings (e.g., cracked teeth or pulpal exposures), which can be useful in the education of patients. In addition, dental photography provides helpful information to our colleagues as well as laboratory technicians, ultimately to provide the highest level of continued care for our patients.

While there may be an artistic aspect to photography, the reproducible exposure and composition of an image is very much scientific in nature. Dental photography is most valuable when the captured image accurately represents the subject (e.g., soft or hard tissues). When a clinical photographer understands the principles of photography and becomes familiar with the available hardware, the process of capturing good-quality images becomes simple.

The first of this two-part series will aim to cover the equipment required and common settings used to capture reproducible intra-oral images.

Components of a dental photography kit

Buying the required gear for a dental photography set-up can be challenging – the various camera systems and models, lenses with different focal-lengths and flashlight systems. It is important to speak to someone knowledgeable in dental photography (not a generic camera salesperson) to find out the components that best fit your budget and your needs. All the components (lens and flash) must be compatible with the camera body and mount type.

TIP: Avoid bundles (body and lens sold together), as often the lens that comes with the camera is not suitable for dental photography.

Components of a dental photography set-up (Figure 1)

Camera body

- Digital single-lens reflex (DSLR) or mirrorless
  - DSLRs are slightly bulkier compared to mirrorless
  - Mirrorless can be more costly compared to DSLRs
- Canon or Nikon
- Crop sensor (cheaper and lighter) or full-frame sensor (more advanced)

FIGURE 1: Main components of a dental photography set-up.

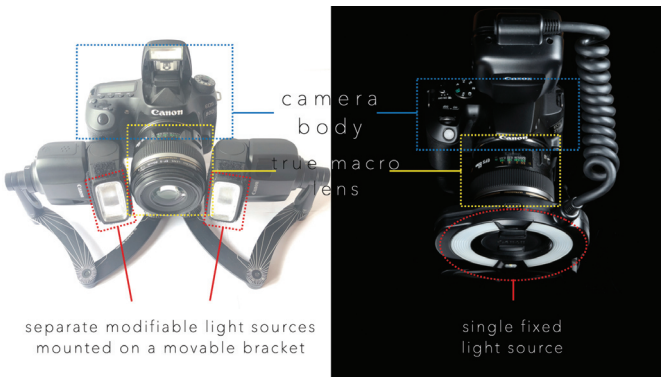

FIGURE 2: Dual flash and ring flash systems.

True macro lens with a 1:1 magnification ratio

- Must be compatible with camera body and mount
- Fixed focal length (commonly: 60mm, 90mm, 100mm, 105mm)
- Internal focusing

Flash system – affects the finish and detail of the image

- Ring flash (**Figures 2** and **3**)
  - Easier to use
  - Images well illuminated but can be harsh
  - Light modification possible (i.e., FlashKap) but limited

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FIGURE 3: Images produced by dual and ring flash systems.

- Dual flash systems (**Figures 2** and **3**)
  - More technique sensitive
  - Images more diffused (softer)
  - Can be tricky to illuminate posterior teeth
  - Light modification using diffusers, bounce cards or softboxes

Table 1 summarises some of the factors to consider before deciding on the best set-up for you.

Camera settings for dental photography (intra-oral)

The camera settings used will affect the exposure and composition of an image. The recommended settings described here and in **Figure 4** would work for most standard shots. Once these have been set, the flash power output (on your flash unit) can be adjusted while testing a frontal retracted intra-oral image at the correct distance (**Figure 4**) until the image captured is optimally illuminated.

Table 1: Factors to consider before deciding on the type of set-up.

	Ring flash	Twin flash	Note
Cost	Lower	Higher	Twin flash set-up may require more components, e.g., movable flash bracket and diffusers or softboxes.
Ease of use	Easier to use	Steeper learning curve	An understanding of lighting principles will make both easy to use.
Weight	Tends to be lighter	Can be bulkier	An important factor to consider to allow for one-handed use of camera.
Light modification	Less versatile, limited	Various options to soften and modify light, e.g., softboxes, bounce cards and diffusers	Modification allows images to be slightly softer, which allows the capture of more details. Modification needs to be controlled, as too soft an image can also compromise the level of detail.
Purpose of images	Medico-legal Basic restorative Patient communication	Advanced restorative Teaching and presentations	The user needs to decide on the purpose of their clinical photography and the type of dentistry practised.

FIGURE 4: Recommended camera settings for dental photography.

FIGURE 5: Recommended accessories for dental photography.

Recommended settings
Shooting mode: Manual (M)
Shutter speed: 1/200
Aperture (f-stop): f22
ISO: 200 (increase to 400 when using an occlusal mirror)
White balance (WB): "Flash" or custom WB (commonly 5,000K to 5,500K)*
*Colour will depend on flash type and ambient lighting – adjust accordingly.
Flash Setting: Manual mode (commonly 1/8 to 1/2) preferable*
*Strength will depend on brand of flash and distance to subject – adjust accordingly.
*Alternative mode: E-TTL (evaluative through-the-lens) is 'automatic-mode', as the flash power is dictated by the lens based on the amount of light available on the subject.

TIP: The above settings of shutter speed, aperture and ISO (collectively termed the 'exposure triangle') would be optimal for most dental images. Altering any one of the above settings will influence the exposure (brightness) of an image but comes at the expense of: motion blur (shutter speed); inadequate depth of field (aperture); or, graining of the image (ISO).

Dental photography accessories

To capture a full clinical photographic series, a set of accessories (**Figure 5**) is required to allow full visualisation of the areas of interest.

Cheek retractors
To photograph the dentition from anterior and buccal aspects, a set of cheek retractors aid in the exposure of teeth, gingival margins and alveolar mucosa by holding the lips and cheeks back. This allows light from the flash systems to illuminate the buccal corridors. There are several different designs of cheek retractors – provided they do not obstruct the visual field or cause discomfort to the patient, they all work. Some designs are more versatile and provide more retraction than others.

TIP: Shiny metal retractors tend to generate unwanted light scatter, so avoid these. Test retractors out on yourself to ensure comfort levels.

Occlusal and sectional mirrors
Occlusal (and sectional) mirrors help to reflect surfaces that may be impossible to capture directly, i.e., occlusal, palatal and lingual surfaces. These exist in two main materials: metal (stainless steel) and glass. While metal mirrors may be more durable and resistant to scratching, the image tends to be a lot darker due to light dispersions on the metal surface. Front surface glass mirrors are ideal for dental photography as they produce a bright and undistorted image.

TIP: Glass mirrors can be prone to scratching and water marks after sterilisation, so ensure that mirrors are dried and wrapped in paper towels prior to placing them in sterile pouches.

Contrastors
A contrastor is a black paddle-shaped accessory used to block out soft-tissue structures palatal or lingual to anterior teeth (i.e., palate, tongue). This allows the image to have a primary area of focus to capture detailed intrinsic colours, textures and anatomical characteristics of hard and soft tissues.

TIP: Contrastors are optional but are particularly useful for laboratory communication.

Memory card
A good-quality high-speed memory card is essential to be able to capture and efficiently transfer images to a computer.

Rechargeable batteries
Most flash systems will require 4 x AA batteries, and it is wise to have good-quality (powerful), rechargeable batteries as well as a spare set.

TIP: Have a set of batteries charging in the background in the event a change is required.

Conclusion

Ultimately, the decision on the type of set-up to purchase will depend on the type of images you wish to capture, the purpose of your photographs, and your budget. Prior to purchasing any equipment, speak to colleagues who have knowledge in the field, or consider a dental photography course to gain a more thorough understanding of the principles of photography. Upon acquiring a camera set-up, start by taking dental photographs of friends and family to familiarise yourself with the equipment, settings and sequence.
In the next part of this two-part series, we will explore the framing of dental images, what constitutes a full clinical photographic series, and troubleshooting in cases of incorrect exposures.