Clinical digital photography. Part 1: Equipment and basic documentation

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Abstract: The use of photography is becoming a standard in modern dental practice. The sharing of pictures is not only essential for communication between dentist, laboratory technician and patient, but also for communication between professionals, undergraduate and postgraduate students with their teachers and for documenting of clinical procedures in cases you want to show to both patients and work colleagues at scientific meetings. This article will describe the necessary equipment for clinical photography, explain its uses and deliver the foundation for basic documentation and structure for clinical cases. The second part will discuss the step by step documentation and show practical examples to improve your results.

Introduction

The first process of photography was presented to the world by Louis J. M. Daguerre at the Paris Academy of Sciences on January 7, 1839.1 In that same year, Alexander S. Wolcott, a manufacturer of dental instruments, designed and patented the first camera producing images on a silver-coated copper plate.2 Thanks to the graphical documentation that this allowed, it created the first dental journal, the American Journal of Dental Science.3

Due to the advancement in technology, we now have the privilege of having digital photography that allows an immediate view of the results and not having to wait for the processing of films as was the case of old movies, utilising silver halide ions in a gelatine emulsion on a strip of celluloid film to capture latent images. The advantage of digital images is that in addition to instantly seeing them through a viewfinder, there is less cost of developing film negatives and their storage is easy and fast. The power of viewing and saving images in computers also saves access and the database is almost immediate. By developing different virtual media files and almost universal use of email, information sharing is almost instantaneous anywhere in the world.

Because many of the procedures performed in dentistry represent established protocols that should be read, learned and then practiced, it becomes clear that photography aids us in teaching or explaining to our patients what we think are common, but to them are complex and mysterious procedures.

Digital Cameras

There are currently hundreds of cameras on the market. If we compare their features and capabilities, we can divide them into 3 groups:

Compact cameras (point and shoot), interchangeable lens cameras (mirrorless system cameras) and reflex cameras, SLRs DSLR (Digital Single Lens Reflex).

Initially, compact cameras (Figure 2) may seem appealing, but they have many limitations. They do not have a consistent image control, the position of the flash is not suitable for intraoral photography, distorted images from utilization of an insufficient macro lens in the wide-angle position, lack of manual exposure and focus problems. One of the biggest problems is the inability to change the lens, which gives its design for a wide angle or middle distance, causes distortion of perspective, as the clinician would have to stand close to the patient. This has another negative effect of poor lighting.4,5

The second group seems promising, but is still in development, and the third group, DSLR cameras (Figure 5), are those with greater advantages for clinical use, thanks to the sensor size and the many options in manual mode, lenses and flashes.

These cameras use a lens for both image composition and image capture. This design, which allows direct viewing and focusing without parallax error, is ideal for dental photography.6,7,8 One of the biggest advantages is the ability to exchange lenses. For example, you can take pictures of landmarks, portraits, and all dental treatments with the same camera, by just changing the lens. The same applies with changing the flash. All professional cameras more than meet the requirements. Semiprofessional cameras (with a more affordable price) that meet these requirements are for example Nikon D7000, D90, D5100, D3200, Canon EOS 60D, 50D or other similar brands.

Flash

The discussion with which design, macro lateral or twin flash light (Figure 4) or ring flash (Figure 5), is most suitable for intraoral photography, and has been quite a debated topic for many years.4,9

The ring flash light is the favourite amongst inexperienced dental photographers and it is considered the universal flash system for general macro photography.6,10 On the one hand, it is true that the greater the distance between the ring flash and the subject, the flatter, less texturised and refined the photos are, while a twin flash generates pictures with more texture, contrast and that look more alive.10

The macro lateral flash shows more variability in light direction, allowing certain details to be highlighted. The overall hue of colour, cracks and also transitions are best captured with the macro lateral flash.10 Probably the only drawback, besides its higher cost, is when photographing posterior regions, where access and space is limited. In these cases, the homogeneous light and easy handling of the ring flash has an advantage. In the author’s experience, when a clinician decides to begin clinical photography, a ring flash is more
than adequate; the extra cost of the macro lateral flash is justified, since differences in the early stages of the learning curve will not be substantial. Then once they handle these techniques, the macro lateral flash is a great contribution.

Lenses

Basically, macro lenses from 50 to 200mm in focal length are used for clinical photography. In the author’s experience, macro lenses of about 100 mm in focal length provide the ideal combination of magnification ability and convenience, working distance for dental purposes. Teleconverters or zoom lenses can be used, but not recommended. The same goes for lenses with autofocus mode. If this is the case, the automatic mode must be switched off and put on manual. Focusing is done manually and moving the ring lens near the focusing ring, better visualization of the structures in the back-cavities, better visualization of the anterior teeth that need treatment. In Figure 18 and 19, you can see examples of a lateral view. In the Figure 16 and 17, you can see a badly taken picture, distracted by multiple flaws such as inadequate background, shadowing on the right side, and an unfavourable facial expression. In contrast, Figure 16 shows a clearer picture, a neutral background, no unwanted shadows, good lighting and a positive facial expression.

The second aspect to show in most of the presentations is an overview of the oral cavity, starting from the anterior teeth. In the Figures 18 and 19, you can see two examples of a photo, the first badly taken and second well taken. In this case, interest should focus on the anterior teeth that need treatment. Therefore, there is no point taking a picture showing lips, facial hair such as moustache’s, lip retractors and excessively showing gingiva. These structures only distract from what is really important.

It is also easy to make errors in lateral photos, an example of this is Figure 20, which shows that, in addition to an underexposed case, the picture is not right, you see the lips and the tip of the mirror. On the contrary Figure 21 is a better photo, having the proper exposure, no distracting elements and the correct angle was taken.

In the occlusal view, both mandibular and maxillary, one must keep certain points in mind. A good mandibular occlusal photo is far more difficult than the maxilla by several factors: Firstly, the tongue needs to be retracted, secondly, the range of movement of the lips of the patient makes the clinician act quickly and without hesitancy, and thirdly, the angle of the photo.

In Figure 22 you notice, in addition to being inadequately illuminated, the axis of the arch is not centered with the photo, we can see the jaws and teeth as well as the edges of the mirror. In contrast, Figure 23 shows an image best achieved where the picture is centered, well lit, and in the absence of other distracting structures.

Case report

One of the main objectives of the documentation process, is to effectively communicate or students what steps were performed to reach certain results. It is also beneficial to graphically present and compare new and already established techniques. The following is simple case of two composite restorations with sectional matrices and a centripetal layering technique. It is an example of the detailed documentation and standardization that images should demonstrate.

Another objective of a systematized and documented presentation is to have graphic material, either for patients to understand or for treatment results objectively, so they have no obscured treatment expectations. These types of aesthetically documented treatments will be discussed and presented with documented cases in a step by step manner in the next chapter of this series, in addition to discussing common mistakes and how to solve them.

Editorial note: References are available from the author.

About the author

Dr. Mohn is a graduate from the University of Chile, School of Dentistry. He received the German IDS in Munich, Westfalens Lippe one year later. Then University College of Dentistry certified him as Implantologist in 2007. In 2008, he published his doctorate thesis in 2008 titled “Osteointegration of zirconia implants, an in vivo study” and got his doctorate degree in 2009.