AN INTRODUCTION TO DENTAL PHOTOGRAPHY.  
A GUIDE ON SPECIFIC CAMERAS AND ACCESSORIES

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REZUMAT

Invazia pe piaţă a aparatelor de fotografie digitală şi preţul accesibil al acestora fac posibilă achiziţionarea şi utilizarea acestor aparate relativ uşor. Pentru o bază de date completă atât de necesară analizei şi descrierii unui caz, fotografiiile realizate pacienţilor sunt o sursă indispensabilă de informaţii. Pentru a realiza acest lucru, aparatele D-SLR sunt cea mai bună alegere. Dotarea acestora cu un obiectiv macro şi un bliţ circular fac posibilă realizarea unor imagini de înaltă calitate în cabinetul de medicină dentară. Prima parte a articolului conţine informaţii de bază şi îndrumări pentru alege un aparat de fotografiat destinaţii cavităţii bucale, precum şi accesoriile necesare.

Cuvinte cheie: fotografie dentară digitală

ABSTRACT

The high number of digital cameras on the market and their convenient price makes these devices accessible for everyone. For a complete record of the case, the patient’s digital images are an indispensable source of information. D-SLR cameras are the best choice in this respect. A macro lens and a ring flash make possible the achievement of high quality images in clinical dental practice. The first part of the article includes basic information and guidance in selecting a digital camera for intraoral images, and its specific accessories, as well.

Key Words: digital dental photography

INTRODUCTION

Many practitioners have found themselves through the following situation: the treatment of the patient has been completed and the treatment chart is just being filled-in. The case proved to be a success, the front fillings look great and the patient is very satisfied. (Fig.1) All of a sudden, the clinician realizes that he omitted to take preoperative photographs, and the case could have been wonderful to be reported for publication or to be shared with the colleagues. Not to mention, this particular case could have been extremely convincing for other hesitating patients. In such cases, there is no way to go back in time to take pictures of the original situation. Thus, the only proof of our work and our results in the dental practice remains the recorded image.¹

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manner of use are just a few of the advantages of digital photo cameras. In the dental practice, photos can be used for a variety of purposes, ranging from communication with the patient and dental technician, archiving the case-book record in the dental office, forensic documentation, patient education, material for dental courses, as well as for scientific publications.

Besides clinical abilities, a good documentation of some cases is a challenge for everyone. Dental practitioners should be encouraged to take as many photos as possible in their daily clinical activity. Taking more digital photos increases the expenses of the practice, but the information offered by the photos is priceless.3

The first part of the article describes the devices necessary for taking good quality photos in the dental office. The second part of the article will present the main photographic methods and procedures.

To obtain a high quality digital image, several technical requirements must be fulfilled:

1. Image sharpness;
2. Depth of field;
3. Correct exposure;
4. Correct lighting, both extraoral and intraoral;
5. Correct white balance;
6. Lack of image distortions;
7. Working distance.

Good quality photos in dental practice require a large depth of field and a shutter speed should not longer than 1/60 seconds, in order to prevent motion-blurred images. These requirements can be met by a camera which has to follow certain criteria, and with a number of accessories: macro lens, ring flash, dental photography mirror, contrastors.

THE PHOTOGRAPHIC CAMERA

Photographic cameras can be classified in two categories: compact cameras and D-SLR (Digital Single Lens Reflex) cameras.

Compact Cameras have limited intraoral performances, but they can be used with good results for extraoral photos. If used without other accessories, they have certain limits in obtaining intraoral details, especially in the posterior area. The built-in flash and the possibility of adjusting its power are positive aspects, but its decentralized position from the image axis is by no means an advantage. Another disadvantage of the flash comes from the different position for action compared to the photographing direction. Also, these types of flashes produce deep shadows in the posterior area, thus reducing the quantity and quality of information in the image. To reduce these inconveniences, the producers have created adaptors which can be applied on the flash to produce a diffuse light.1,2

D-SLR Cameras. The component parts of a D-SLR camera dedicated for dental photography are:

- The camera body; (Fig. 2)
- The lens;
- The flash.

There is no doubt in dental literature that SLR (Single Lens Reflex) cameras are best suited for medical photography. Their price is relatively high but, in principle, it is not necessary to choose the most expensive camera body, it is advisable to allocate the financial resources towards lenses or flashes. Table 1 shows the current camera models on the market fulfilling the requirements for high quality photos in dental practice.

Digital photography has been also connected with dental microscopy, either by coupling DSLR or video cameras with the operating microscope, or by incorporating a digital camera into the microscope case. The latter acquires the image via optical fiber from the microscope body.

Unlike compact cameras, SLR cameras create the image as follows: the light passing through the lens is directed towards a mirror inclined at 45 degrees, and then reaches a matte screen (the camera viewfinder). Looking at the screen, the photographer can frame the image, can notice its sharpness and its depth-of-field. Other advantages of such cameras are: the manual exposure, the depth-of-field preview button, the autofocus function, the short shutter lag etc.

Beside the camera, in order to take macro photographs, a special «macro» lens is needed, and a ring flash as well. The last two components (macro lens and ring flash) are compulsory in obtaining high quality images in dentistry.

The Lens

The vast majority of the photos taken in the dental office are macro photos, so they naturally require
taking intraoral images, difficulties, especially in the lateral areas, such as insufficient light, deep shadows etc. are encountered. Thus, dental photography is made almost exclusively by using a flash, with the exception of portraits or images of objects, where the available light can be used.

The main advantages of the ring flash are:
- A short duration of the flash action, which eliminates the risk of the camera movement;
- A high intensity of light, allowing a short time of exposure and a small aperture;
- The color temperature is identical as daylight, so the white balance preset should be set on «flash»;
- Ring flashes are small, allowing for handheld photography;
- Low emission of heat, no stress for the patient.

The most difficult aspect in using flashes is choosing the amount of light and the ratio between light and shadow in the image. But the majority of modern ring flashes have the TTL function which calculates the right amount of light which results in

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<th>Brand</th>
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Table 1. The current camera models on the market fulfilling the requirements for high quality photos in dental practice.

Table 2. The characteristics of the macro lenses of the main lens producers.

![Figure 3. The main macro lenses for D-SLR cameras available on the market (Canon, Olympus, Sigma, Pentax, Sony).](image)

The Ring Flash

Photographing means «writing with light». It is understandable why the light is the most important factor in creating an image. In the dental office, extraoral (face, profile, plaster models, prosthetic works, anatomical pieces etc.) or intraoral photos (frontal, lateral, occlusal views etc.) are taken. When macro lenses. These lenses are completely different from zoom lenses with «macro» option, which are of no use in dentistry, as they have a magnification factor of only 1:4.

The magnification factor represents the magnifying power of the lens. For example, a lens with a magnification factor of 1:1 forms the image on the film (sensor) with the same size as the photographed object. So, true macro lenses have a magnification factor of 1:1, and they have fixed focal lengths, of 50mm, 60mm, 90mm, 100mm, 105mm or 200mm. The 100mm and 105mm macro lenses are best suited for dental photography. (Fig. 3) The table below shows the macro lenses of the main lens manufacturers on the market.
a good lighting of the photographed subject. Ring flashes are special flashes that are placed in front of the lens, thus allowing the orientation of light on the photographic axis, as well as a uniform distribution of light. Dark areas and shadows appearing in the lateral area are eliminated. Camera manufacturers create ring flashes compatible only with their own products, at affordable prices. The EM 140 DG Sigma model is a ring flash compatible with Canon, Nikon and Sigma cameras, and is significantly cheaper. (Fig. 5) 

The Dental Photographic Mirrors

Dental photographic mirrors are indispensable accessories in taking lateral or occlusal views. (Figs. 6,7) These mirrors differ from ordinary mirrors in that the image reflection is made at the surface of the mirror, right on the reflecting surface. (Fig. 8) Classical mirrors have the reflecting layer covered by protective glass, so two images are created, one reflected by the reflecting metallic layer, and the other reflected by the glass surface. The reflecting surfaces of older special photographic mirrors were made of highly polished surgical stainless steel, modern photographic mirrors are made of Rhodium or Titanium. They are autoclavable and present in various shapes, depending on the area to be photographed. (Figs. 9,10) Before placing the photographic mirrors in the oral cavity, it is recommended to warm them up using warm water in order to prevent the steaming of their surface when introduced in the mouth. Steaming of the photographic mirrors can be also prevented by blowing dry air while taking images. They have to be cleaned (with a microfiber cloth), disinfected and kept with care, as they can be very easily damaged by scratching.
Photographic Contrastors

In the photographs of the frontal teeth, the background usually distracts the attention of the viewer. The inconvenience can be eliminated with the help of contractors, which are dark autoclavable matte metallic shields, available in various shapes, used to enhance the teeth contrast and to create a uniform black background. (Fig. 12) Contrastors can be handmade out of black cardboard or dark matte plexiglass or can be purchased from specialized manufacturers.3

The special methods and procedures for taking clinical photos in the dental office will be described in a future article.

Dental mirrors can be also used to enhance the appearance of prosthetic works, when displayed in suggestive settings. (Fig 11)2,4

REFERENCES