Review Article

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AN OVERVIEW ON DENTAL PHOTOGRAPHY

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ABSTRACT:

It would be hard to imagine any part of our existence that is not related to photography. Dental photography is an inseparably integral part of contemporary dentistry. As one important example, visual images are crucially important in matching the color of an artificial tooth to the adjacent natural teeth. Today, in a modern dental office, photography is routinely used for documentation, for marketing, and as a communication tool to explain different procedures to patients. If one has access to the right equipment and follows some general rules, the use of photography in dentistry is simpler now than ever before.

Key Words: Dental photography, Digital dental photography, Intra-oral photography, Extra-oral photography

INTRODUCTION:

Photography has been in existence for over a century. It can best be described as an 'Art' for various purposes. It can be a hobby, a profession or a science as it has developed into in recent years. The use of photography are immense. It varies from a family snap shots which is a reminder of our past days, aerial photographs to learn about enemy loop movements and plan battle strategy. Anthropologists and sociologists study photographs of various groups of people for clues to patterns of human behaviour. [1]

Photography is a word derived from the Greek words photos ("light") and graphein ("to draw"). The word was first used by the scientist Sir John F.W. Herschel in 1839. It is a method of recording images by the action of light, or related radiation, on a sensitive material.[2] These images are then chemically processed into a photograph; which provides a representation of object. [1]

Photography in dentistry has made some changes and progress since November 1968. Photographic information for the health professional has little or no standard. It is no wonder that many dentist still "take pictures" so say get me a shot of that. Quality photography involves "making photographs".[3]

WHY DENTAL PHOTOGRAPHY?

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Dental photography is an inseparably integral part of contemporary dentistry. There are various reasons for taking photos in the dental office:

-Having photographic documentation of the initial condition, the individual treatment steps, and the final result is very important.

-Dentists document their work and monitor their skills. Good recording is a part of the quality control system and offers dentists a wealth of information; for example, the gingival condition of the patient to color differences of veneer.

-Photographs simplify communication between the dentist and the dental laboratory. Accompanying photographs greatly facilitate the work of the dental technician. The needs of both dentist and patient can be better presented and consequently the result is more satisfactory. There is hardly a bigger challenge for a dental technician than fabricating a single anterior veneer or crown. A good illustration of the situation helps the technician to succeed.

-Photographs are very helpful when used for both patient motivation and education. Photographs document what can be achieved with modern dentistry.

-"Before and after" recordings can be used as an excellent marketing tool. They make it possible to demonstrate a planned treatment to the patient. It is particularly convincing when dentists presents their own treatment cases during these sessions ("1 did that, and I can do that for you too! ").

-After treatment is completed, give patients "before and after" photographs that are mounted in a little album and which they can take home. A satisfied patient will recruit new patients. Excellence is and will remain the best advertisement for your practice. What, after all, is marketing? The answer is: perform well and make sure others talk about it.

-Photographs are also helpful in communicating with health providers and insurance companies. But it can also be extremely helpful to have good photographs in cases involving legal disputes. [4]

Today's photography offers two alternatives:

- Classical photography that uses film material as photographic carrier and requires laboratory equipment and
- Digital photography that produces an image electronically and is ready for reproduction momentarily.

Digital photography has today, quite sure, penetrated into all segments of life, providing new facts and perceptions in the field of science, medicine, industry, fashion design, communications and arts. Numerous statements in technical literature and reports in everyday practice point to its great significance in

contemporary dentistry, both from the aspect of its role in documenting dental treatment, communication in the relation dentist-patient-dental technician, self-checking (control) of one's own results, illustration of lectures and publications, and the aspect of conceptualizing efficient marketing and accomplishing electronic teledental system of connections. Its application in dental practice is simple, fast and utterly useful in documenting procedures of work, effectuating the education of patients and pursuing clinical investigations, thus securing many benefits to dentists and patients.[5] [Figure 1]

The requirements cited below for a good dental photograph result in those for the camera system itself. In particular these are:

- adequate reproduction ratio
- sufficient working distance
- sufficient depth of field
- even exposure (also within the mouth)
- correct illumination, independent of reflections from subject
- correct color rendition
- easy use
- cost effective. [6]

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 component parts of a D-SLR camera dedicated for dental photography: [Figure 2]

- camera body
- lens
- flash/light [7]

Dental photography has two parts:

Intraoral and extraoral photography. Carlos Boudet has recommended a standard set of photographs that consists of the following:

1. Extraoral photos (3): Two frontal views of the face, one in repose and one smiling. And one profile shot.
2. Intraoral photos (5): Five Retracted views, an anterior view, a right view and a left view. Two mirror occlusal shots, one of the mandible and one of the maxilla.
3. For cosmetic cases, an anterior retracted view with the teeth apart is very helpful and that makes for six intraoral photos instead of five.[8]

INTRA-ORAL PHOTOGRAPHY

The chief focus of dental photography is, of course, the mouth and the perioral region.

Taking the photographs – tips for intra-oral views:

a. Look through the viewfinder and visualise the end result. Think why am I taking this photograph?

b. Look round the edges of the viewfinder frame for distractions such as the edges of mirrors, retractors, hairs, impression material. Also look out for fragments of cement, bubbles of saliva, blood, food debris and lipstick on teeth.

c. Dry the tissues, use suction and gentle streams of air from the three-in-one syringe.

d. Learn how to focus accurately, and always be prepared so that the patient is not kept posed for too long, especially when taking mirror shots – pre-focus on the area to be photographed before placing the mirror.

e. Use small apertures (f22 and above) for close-ups – set the camera to manual focus, then set the magnification ratio, take aim and focus by moving backwards and forwards, towards or away – once set, do not touch the focusing ring on the lens. 1:3 gives a good overall view. Remember the range of sharp focus is narrow especially at high magnifications. It is best to focus on a point lying 1/3 behind and 2/3 in front of the area to be photographed; for instance, if photographing an anterior view with lips retracted, focus on the distal aspect of the lateral incisor.

f. Hold the camera firmly and securely, cradling the lens in the palm of one hand.

g. Have the patient sit comfortably, semi-upright or supine (some prefer to take upper occlusal shots from behind the patient), with the head turned towards the photographer – keep camera perpendicular to the occlusal plane, as tilting will cause the teeth to appear distorted, elongated or foreshortened.

h. Have the operating light on to assist focusing; some flash units have a built-in modelling light – so make sure to switch it on!

i. When using retractors, Vaseline the patient's lips first. Place the retractor at an angle in the corner of the mouth and rotate it into position. Retract the lips/cheek gently outwards and forwards on anterior views to see the "buccal corridor". Decide if you want the teeth in occlusion or apart.

j. Dry the tissues, and ask the patient to moisten their lips and to curl their tongue back.

k. Hold your breath and ask your patient to do the same. Wear a mask or

make sure your breath is fresh, as in many cases you will only be a few inches away from the patient.

l. Prevent mirrors from fogging by pre-warming the mirrors in warm water, or by blowing a stream of air with a three-in-one syringe, over the mirror once in use. For occlusal views, focus on the image you see in the mirror in the premolar region. Keep the camera perpendicular to the mirror.

m. Frame, Focus and Click.

n. Check the result in the monitor viewing screen at the back of the camera.[9]

EXTRA-ORAL PHOTOGRAPHY

Dental portraits are predominantly used for documentation in orthodontics, surgery, and prosthetic dentistry.

For facial photographs, certain rule remains constant:

• Head should be positioned so that the Frankfurt Horizontal Plane (FH) is parallel to the floor. This means that the eyes are in one line.

• Avoid closed eyes. Pre-warn the patient for the use of flash and ask him to keep the eyes open. Alternatively, ask the patient to blink just before clicking.

• Avoid red eyes. (Red eye occurs when flash bounces back off the retina and onto the film causing them to look red). Use red eye reduction facility of camera.

• Avoid shadow. It destroys the visual appeal and acts as a distractor. Use a plain white cotton cloth as a background. One light source should be at the top of patient's head. Use of telephoto lens, and intelligent use of point flash helps prevent shadows.

• Avoid open mouth in front and profile view if there is no breathing problem. This helps in visualizing the lip strain and the effect of anterior teeth on a lip profile. Similarly, avoid glasses as they create a glare with "bounce back" from a flash.

• All facial views should be taken in portrait format only. Landscape format unnecessarily leaves too much 'negative' space.

• Use smaller aperture (large f-number usually f/8) to get sufficient depth of field and have entire picture in sharp focus.

• Use of built-in point flash of a camera is sufficient for facial photography.

• Whenever possible, shoot facial photographs without using flash to avoid shadows.[10] [Figure 3]

THE DIGITAL WORKFLOW

In dental photography, discussing the "workflow" is important for successful and organised documentation of the clinical cases. There are many options for

a workflow of digital images. In principle, the procedure should be:

- Transferring the images into a special file "NEW IMAGES".
- Making a copy of the image files "as they come out of the camera" on a CD.
- Deleting the "bad" images.
- Renaming the images.
- Editing the images.
- Adding keywords and captions.
- Transferring the image files to their final destination file in the image archive.
- Back-up of the image files on a second (external) storage medium.

After image data are stored in the computer and backed up, the data on the memory card can be deleted. The card is then removed from the reader and inserted into the camera again.[6]

The best known software for image-editing is - without a doubt - Adobe Photoshop. Corel's Paint Shop Pro is another full-featured option.

Some of the recommended programs include - but are not limited to - the following:

- Microsoft's Preview (bundled with Windows). It has all the basic functions for rotating, flipping, cropping, and enhancing the color and brightness of digital images.
- Picasa (Windows & Mac): Not only does it have all the basic image editing functions in an easy-to-use setup, Picasa also provides an excellent cataloguing feature for all your patients' images, and best of all, it's free!
- Fast-stone Image Viewer (Windows): Another free piece of software that has most of the necessary functions as well as containing a simple and efficient library manager for organizing your photos into albums.
- GIMP (Windows & Mac): it is also a free, open-source software with amazing capabilities, almost like a free version of Adobe's Photoshop!
- On Apple's Mac computers, the built-in "Preview" can also manage all the basic editing functions required. The bundled "iPhoto" can also do the same, and can make managing patients albums an easy and fun task. "Pixelmator" is a more advanced editing software that can also be considered a slimmed-down version of Adobe's Photoshop for Mac.[11]

The following procedure has proven useful:

- Import image into Photoshop[®] (or other editing program).
- Align and crop image.

- Adjust brightness and contrast.
- Perform color correction.
- Remove dust spots.
- Sharpen the image.[6]

SOURCES OF ERRORS IN CLINICAL PHOTOGRAPHY

Clinical photographs taken before, during and after orthodontic treatment form an essential part of the patients' records. If correctly taken, they offer more useful information about the malocclusion and treatment than any other clinical record. There are, however, many potential sources of errors whilst obtaining these invaluable records. Photographs of inadequate quality may misrepresent the patients starting malocclusion, may inaccurately reflect progress with treatment or may inaccurately record dental anomalies and defects that may be present.

There are a number of errors that are commonly seen and these can be divided into two groups. The first group comprises errors due to inappropriate choice or use of equipment including the camera, lens, flash, retractors, mirrors or suction, or a lack of understanding of the digital technology resulting in inadequate or inappropriate images. The second group of errors relates to any recording medium and involves inappropriate positioning of the subjects.

Good quality accurate clinical photographs can easily be obtained using the correct equipment and appropriately trained staff. An awareness of all the possible errors in extra- and intra-oral clinical photography will increase the chances of obtaining high quality images.[12]

CONCLUSION:

It would be hard to imagine any part of our existence that is not related to photography. The emersion of photography represents a milestone in the development of human society making life richer and more comprehensive. Photography has influence our conscience so much that the saying that an image is worth a thousand words has become a notorious fact. Photography has entered all segments of life providing new facts and knowledge in science, medicine, industry, communication and art.[13]

Photography is just as indispensable for dentistry as radiography. Today, in a modern dental office, photography is routinely used for documentation, for marketing, and as a communication tool to explain different procedures to patients. If one has access to the right equipment and follows some general rules, the use of photography in dentistry is simpler now than ever before.

Thus, to successfully integrate photography into the dental practice, the dentist and the dental assistant need to learn how to handle the camera just

as well as they now handle radiographic equipment.[4]

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FIGURES:

Figure 1: Modern digital camera

Figure 2: Camera body, lens, flash light

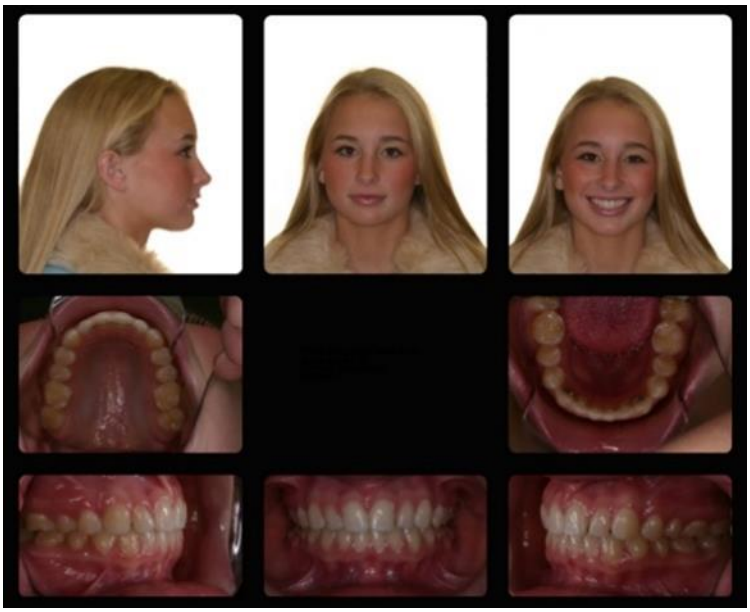

Figure 3: Extra-oral and Intra-oral photography