

REVIEW ARTICLE

Photography in Clinical Dentistry- A Review**Manjunath.S.G, Raju Ragavendra.T, Sowmya.K. Setty, Jayalakshmi.K****Abstract**

Intraoral photography is a part of contemporary dental practice. Intraoral conditions which in the course of dental treatment are subject to change can be recorded in detail by means of photographs. These provide an improved documentation and the option of monitoring particular situations over longer periods of time. With the right skills and photographic methods, the clinician enhances communication with the patient regarding treatment planning. This article emphasizes types of camera and the accessories for intraoral photography which enables the practitioner to make standardized photographic documentation of cases.

Key Words: Intraoral Photography; Single Lens Reflex Camera; Digital Camera; Dental Photography

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Photography has a wide role of significance in teaching, research and clinical recording. (1) Clinical photography has become an important part of standard dental practice. Clinicians in both general practice and specialty areas have found the pictorial representation of a patient's condition to be of a valuable part of the patient's record. (2) When evidence-based dentistry is gaining roots worldwide, dental photography finds an important place in providing the evidence. In addition to conventional patient records and radiographs, dental photography offers the dental professional another possibility of visual reconstruction of the various stages of treatment.

Photographs are an essential part of clinical records for number of reasons: a) *Unreliable memories:* Within a matter of months, patients and practitioners tend to forget how severe the original condition was. Having photos available at every visit reminds both the dentist and the patient of the original situation, against which all improvements can be judged. b) *Treatment evaluations:* A quick scan of sequential slides with patients during treatment will save lengthy explanations of intended treatment plan. c) *Teaching needs:* Slides are probably the most important teaching aids in dentistry. If cases are to be presented in lectures, papers and posters, a high standard photograph are required. d) *Medico legal Cases:* It is critical to have clinical photographs that indicate any preexisting pathology or trauma to the teeth. Proper records will help avoid any post-treatment disputes. (3)

Types of cameras

Cameras are broadly divided into three main types: a) Those based on the single lens reflex (SLR camera) design with interchangeable lenses. b) Those based on a compact design where the lenses are not interchangeable - Digital camera and intraoral camera. c) Digital SLR camera (combination of Digital and SLR camera).

Because of the need for photography to be done on-site, most camera systems are kept chair side or in close proximity within the clinic. The camera system could include (in most instances), a 35mm single lens reflex system (SLR) camera, a lens capable of close-up photography, an electronic flash, mirrors and retractors. The specific brand of camera is not important, but rather the camera system capable of doing the required functions and being simple to operate is most important. Most dental photography is done with 35mm SLR camera systems, and of course digital cameras. (4)

Single Lens Reflex (SLR) camera system: SLR camera used in dental photography has two main parts, its body and lens. The camera body can influence the ease in which good results of photography can be obtained; by offering the photographer additional features such as auto-exposure and auto advance. Cameras that are manual will function perfectly adequate, however cameras with auto exposure allow for more concentration on the patient and not photography. The use of a SLR is valuable for several reasons i.e. there are a variety of films to choose, it is compact and easy to use, but probably the most important is that they can utilize interchangeable lenses. Obtaining the highest quality photographs is facilitated with a close-up lens that is inscribed with reproduction numbers. Good quality lenses come inscribed with these numbers allowing for standardization of views, magnifications and exposure information. (4)

Digital Camera system: Digital photography has become very popular and its application to dentistry offers many advantages. This allows photographic freedom, immediate review of pictures and most cost effective. They have a LCD screen so that the pictures can be reviewed and poor quality pictures can be deleted. The digital photographs can be directly placed in

continuing education presentations without having to wait for them to be processed by a photolab. In the near future, dentists will likely to be involved in teleconsulting and teleconferencing. The consultants can be e-mail the pictures and/or radiographs for review, without the referring dentist having to travel to the consultant's office.(5) Choosing the right digital camera is not an easy task. Digital cameras are more computer-centric than conventional cameras. In comparison with the latter cameras, digital cameras use charge-coupled device (CCD) or complementary metal oxide semiconductor (CMOS), instead of the conventional film. It is this chip that converts the light entering the camera into an electrical signal, which eventually ends up as the digital image. The recorded image can be viewed on a LCD screen on the rear of the camera. Subsequently, it can be downloaded to a computer to edit, print, send as e-mail, or post in albums to share with others on the Internet. However, the quality of images shot with digital cameras is lower than of images recorded on chemical films.

The heart of any digital camera is the CCD. The individual areas on the CCD, which register the light falling onto them, are photodiodes, otherwise known as pixels. Megapixels are therefore millions of such pixels. So the resolution of the camera, is a measure of how many pixels or tiny bits of information the camera's image sensor uses to split up and then reassemble the picture. The higher the MP (Mega Pixel) number, the smaller the pixels, the better the resolution. A chip with 1600 pixels x1200 pixels will be a 2 megapixel camera, whilst a camera with 3200x 2400 pixels on the chip will be 4 megapixels and so on. A digital zoom is not a true zoom lens, it merely crops the image throwing away the information at the edges and increasing the apparent magnification of the lens. Optical zoom implies the actual change in focal length. It functions by using a system of lenses to refract light and magnify the image on the CCD. Optical zoom magnifies the image quality along with the resulting details and clarity unlike digital zoom.(1, 5)

Intraoral camera: An intraoral camera is a tiny device with a video camera that moves around inside the mouth and generates a surface video examination of the teeth. The images can be stored, and later enlarged and printed. (6)

As it is nearly impossible to see inside your own mouth, intraoral cameras provide a proper view. The pen-sized camera features a disposable cover to prevent contamination. As the camera moves around the mouth, it sends video

images to a computing unit where the images are enlarged and transmitted to a television screen. With the images produced by the intraoral camera, patients can see each of his/her teeth and dentists can indicate problems such as fractured tooth, plaque, decay, gingival disease, defective fillings, and so on. Since the intraoral camera generates images that are stored, enlarged and analyzed, often dental problems are caught in the early stages and sometimes even problems that dentists might otherwise miss with a visual examination are seen. Once treatment options are discussed and agreed upon, intraoral cameras can be used to effectively track treatment progress. (1)

Digital SLR camera: These cameras combine the features of the SLR system with the digital camera. These include: i) an interchangeable lens which gives the option of taking extreme telephoto images that would be difficult or impossible with a compact digital camera. Add-on lenses are available for extending to reach of such cameras, but the quality of add-on lenses cannot be compared with that of an interchangeable lens. ii) Digital SLRs with large sensors will have much less noise than compact cameras. This will give better fine detail, better shadow detail, and more flexibility to recover from exposure errors. When you examine a shot from a digital SLR at full size, it will look smooth and have pure colors. At the same MP rating, you will get more flexibility to crop and enlarge with images from a digital SLR. iii) Digital SLRs use the faster and more accurate phase detection autofocus method and generally have shorter shutter lag times, making it easier to capture the action.(7)

Camera Accessories: In addition to the camera some accessories are also required for a good quality photograph: a) Ring Flash –The ring flash on the SLR type camera produces excellent images. b) Memory card – the digital camera usually comes with a small card, which will hold relatively few images. Memory cards are available in different formats such as Compact Flash, Smart Media, XD cards and Microdrives. They can reach upto 8 GB in size and can store thousands of images dependent on the image format (eg TIFF, JPEG) that is used at the time the picture is taken. Not all cameras take all cards, but some will accept more than one type. c) Filter - If there is an internal thread on the lens it is worth buying a screw-on filter in order to protect it. This serves the dual purpose of lens protection and reducing the brightness of the image. Although the SLR cameras have removable lenses they are very expensive and worth protecting with a relatively inexpensive filter. d) Batteries – one feature

common virtually to all digital cameras is their avid use of battery power. It is therefore worth buying an additional set, of the correct size, NiMH rechargeable batteries and a quick charger, so that you always have a fresh set of charged batteries. The Lithium batteries are more expensive cameras and are not rechargeable and so it is worth carrying a spare. e) Camera pouch(7) this is useful to protect the camera when not in use.

Photographic Accessories: a) Cheek Retractors: They are used to retract the lips, labial and buccal mucosa out of the area to be photographed so that the maximum amount of light enters oral cavity which improves the visibility. Cheek retractors are available in clear plastic or metal. Metal retractors are less attractive but can be autoclaved. The transparent plastic retractors are aesthetically more acceptable and natural tissue colour shows through them, limiting the potential for distraction. (Figure1). Retractors are either single or double-ended. Double-ended retractors provide both a small and large curvature. This allows adaptability to a variety of mouth sizes. The end of the retractors acts as a handle to aid retraction. Single-ended plastic retractors have longer, tapered handles. The curved end is larger for excellent lip retraction. Strict aseptic measures are important during intraoral photography as in any other dental procedures in which infectious pathogens can be transmitted to the dental personnel or between patients. Because plastic retractors cannot be autoclaved, chemical sterilization is necessary. After sterilization, the retractors should be rinsed well to remove all traces of the chemical, which could be irritating to the patient. (1)



Figure 1: Cheek retractors in position depicting teeth in occlusion & its adjacent tissues.

Technique for inserting retractors: a) Moisten the retractors in water. b) Ask the patient to relax the lips and open the mouth slightly. c) Place the rim of the retractor onto the edge of the lower lip. d) Rotate the handle of the retractor until it is parallel to the corner of the mouth. e) Repeat this for the other side of the mouth if necessary. f) Instruct the patient to bite down on the posterior teeth. Pull out the retractors laterally and slightly forward. Avoid pulling the retractor handles toward the ears. This will cause the buccal mucosa to be

pressed onto the buccal surfaces of the teeth, as well as cause the patient discomfort when the retractor is pressed against the gingiva and alveolar process.(1)

Intraoral mirrors: Intraoral mirrors are used to provide a reflected image when areas of difficult access are photographed. Glass mirrors that have been rhodium plated on both sides create an excellent reflective surface. Intraoral mirrors are available in several sizes. The mirrors allow flexibility with minimal equipment for general adult photography. For photography of the pediatric patient smaller mirrors are recommended especially a child-size occlusal mirror. The large end of the mirror provides an excellent surface for capturing occlusal views, and the smaller end can be placed for palatal and lingual views. The mirror is easy to hold and keeps fingers from being too close to the scene. Mirrors can be washed with detergent and water. Care must be taken when using mirror as they are easily scratched or broken. They should be wiped with a soft paper napkin or cloth and wrapped in cloth or felt for safekeeping.(8)

Technique for inserting mirrors: a) Place the mirror in warm water before use to prevent fogging. A small heating pad could also be used to keep mirrors warm. b) Insert the appropriate cheek retractors. c) Select the mirror and the appropriate end for the desired view. d) Place the mirror flat into the mouth. As you retract with your fingers, rotate the mirror into position. Take care not to hit the teeth or press into the alveolar process, as this is annoying and uncomfortable for the patient. e) Hold the mirror securely at the opposite end while maintaining retraction. f) If fogging occurs, blow a gentle stream of compressed air onto the mirror.

Even full-time medical photographers have difficulty achieving high-quality dental photographs. There are cameras now which require minimal adjustments in routine clinical use and put outstanding intraoral and extraoral photography within the reach of every dentist (3). This article briefly covers the types of cameras with the advantages and disadvantages associated with each, and the accessories which come in handy when taking intraoral photographs will make quality photographs, a reality and aimed primarily for the amateur who wishes to do his/her own photographic work.

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References

1. McLaren EA, Terry DA. Photography in dentistry. J Calif Dent Assoc. 2001;29(10):735-42.
2. Woodall IR. Comprehensive dental hygiene care. St Louis: CV Mosby; 1993. 336-55 .
3. Sandler J, Murray A. Clinical photography in orthodontics. Journal of clinical orthodontics: JCO. 1997;31(11):729-40.
4. Peres M. Dental photography for photographers 2002. Available from: <http://people.rit.edu/mrppph/Denta.html>.
5. Simon T. Dental Digital Photography 2007. Available from: http://www.idm.com.au/pdfs/Dental_Photography.pdf
6. Hackel A, Bühs F, Lehr H, Schrader S. Dental Intra-oral Camera. US Patent 20,110,234,781; 2011.
7. Sandler J, Murray A. Digital photography in orthodontics. Journal of Orthodontics. 2001;28(3):197.
8. Claman L, Patton D, Rashid R. Standardized portrait photography for dental patients. American Journal of Orthodontics and Dentofacial Orthopedics. 1990;98(3):197-205.

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