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Digital dental photography– An innovative tool of dentistry

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Abstract
Modern dental practise now incorporates photography. Detailed documentation of intraoral and orofacial conditions that are subject to change during dental treatment can be done using pictures. They offer effective documentation and the option to keep an eye on certain circumstances over extended periods of time. The doctor can improve communication and contact with the patient regarding treatment plans by using the appropriate skills and photography techniques.

Keywords: dental photography; digital photography; digital camera; intraoral photography; single lens reflex camera

Introduction
Over a century has passed since the invention of photography. It is best characterised as a "Art" for a variety of reasons. According to how it has evolved in recent years, it might be a hobby, a vocation, or a science. The term "photography" comes from the Greek words "photos" (meaning "light") and "graphein" ("to draw"). The scientist Sir John F.W. Herschel coined the term in 1839. It is a technique for capturing photographs by using light or similar radiation to interact with a sensitive substance. These pictures are then chemically altered to create photographs, which show an object.
The transition from film-based photography to digital imaging has been the main advancement in dental photography.

History
Since Louis J. M. Daguerre introduced photography to the globe on January 7, 1839 at the Paris Academy of Sciences, there has been interest in using technology to accurately reproduce and record visual dental pictures. Alexander S. Wolcott, a New York-based manufacturer of dental instruments, was the one to patent the first camera based on Daguerre's idea in that same year.
The American Journal of Dental Science, the first dental journal ever published, was inspired by this incredible new-possibilities using photos. Dental images taken before and after surgery were published by Thompson and Ide. Since then, dentists have taken detailed pictures of the oral cavity using extra-oral cameras. Because dentists could keep an eye on oral problems to produce the most aesthetically pleasing results, this was a windfall for restorative and cosmetic dentistry.
When dental procedures were first documented with before-and-after photos in 1848, Drs. R. Thompson and W. Elde of Columbus, Ohio, opened a new era in dental diagnosis and treatment planning.
Clinical photography is now being used by the dentistry profession to aid in diagnosis and treatment planning. Its importance in presenting information, educating patients, and documenting instances has grown to the point where it is now crucial to decisions about diagnosis and treatment [1].
Midway through the 1990s, digital cameras started to become widely available. Despite having a poor resolution, it had already begun to spark attention among amateurs and purists. Digital photography has totally replaced film photography in research and medicine in the last ten years or so. With the advent of modern software, anything can now be measured, altered, shared, and integrated into brand-new communication tools with the simple click of a mouse. Additionally, the photos can now be animated and distributed on websites as well as utilised in reports. These uses of film technology are unparalleled.

The following are some justifications for using dental photography
- Keep a thorough log of the entire trip you and the patient take.
- Assist in case presentation.
- To provide evidence in the event of a dispute.
- Improved patient communication and education
- Verification of insurance
- Consultation with an expert
- Advertising and marketing by professionals
- Work ethic and treatment philosophy

Advantages of digital dental photography
- Images are instantly accessible and simple to share.
- Processing of the film is free.
- There is no need for chemical development.
- increased repeatability
- The photos' metadata can be created.
- Real-time image illumination adjustments are possible.

Disadvantages of digital dental photography
- Incline learning curve.
- Preparation and proactive file management for accessibility.
- Potential for fraud.

Basic armamentarium: The following is a list of the essential dental photography equipment.

- Digital camera
- Light and electronic flash systems
- Contrastors
- Intra-oral Mirrors
- Three Angles
- Monochrome
- Macro lens

Digital camera

Three broad categories can be used to categorise cameras:

- Single Lens Reflex (SLR camera): design with interchangeable lenses.
- Compact design where the lenses are not interchangeable-Digital camera and intra-oral camera.
- Digital SLR camera (combination of Digital and SLR camera).

Light and electronic flash systems

One of the most important components in producing a high-quality photograph is proper illumination. In most intraoral photographic circumstances, ambient natural light is typically insufficient to highlight all the dark areas, necessitating the use of an additional artificial flash source. Neutral colour temperature light can be produced using an electrical flash, i.e., relatively high output light for a short duration.

There are three types of electronic flash system configurations available for dental photography:

- Ring Flash (Fig 1): It is considered the universal flash system for general macrophotography.
- Point flash: In order to give a unidirectional light from all angles, a single strobe light source is positioned in several locations all around the lens.
- This flash system's capacity to record surface texture information and contour is an advantage. To establish sufficient information, it is advised that many photos with various flash positions be taken. This kind of flash system needs a lot of practise and extra setup time to adjust the flash position prior to each exposure.
- Twin flash (Fig 2): Its configuration consists of two flash units that are mounted next to the lens. The light sources can be positioned to create custom mild shadowing to reveal texture with depth and life-like effects. Mastering the use of this lighting system will yield professional photographic results.

Contrastors

These are used intraorally to provide the appearance of a black background. They provide as the background for a fantastic contrast between the pink and the white in the mouth, as their name suggests. When it comes to creating artistic photos, particularly of the upper arch, contrastors are a "must-have."

- Have the patient or assistant hold it underneath the top ach while you click.
- Photos must be cleanly cropped.

Intra-oral Mirrors

Like long-handled front-silvered rhodium-coated glass mirrors. The inexpensive plastic intra-oral mirrors are easily damaged, frequently fog, and lack sufficient clarity. As they will become essential in daily practise, it is advisable to invest in premium glass intra-oral relectors [3]. They often come in small and medium sizes. They should be carefully stored while not in use to prevent accidental deterioration and unwanted scratches, which would lower the image quality.

Three Angles

In cases involving both anterior and posterior teeth, as well as any sort of occlusal rehabilitation, all three angles are necessary for comprehensive protocol and case documentation/presentation. Frontal, left lateral, and right lateral are the three angles. To better understand the upper anterior inclination, overjet, overbite, and pre-operative occlusion [4].

Monochrome

Particularly in circumstances involving both anterior and posterior teeth as well as any form of occlusal therapy, all three angles are necessary for comprehensive protocol and case documentation/presentation. The frontal, left lateral, and right lateral angles are the three possible perspectives. In order to understand the pre-operative occlusion, over jet, overbite, and upper anterior inclination.

Macro lens

These are necessary for capturing macro texture, which includes, among other things, the texture of dentures, composite crowns, and gingival stippling (Figure 7).

Although the majority of mobile cameras offer a "macro mode," you might want to use an additional macro lens for more expensive photographs.

Smartphone dental photography

Smartphone photography is gaining popularity as accessibility is beginning to pay off. The most recent smartphones can take pictures to a professional grade thanks to technology, but to get the precise value, they may need to be corrected for colour using spectrophotometry. The smartphone lens can have distorted edges as a result of the different focus point, which may not be desirable for macro photography [5]. The surface textures of an enamel or ceramic prosthesis can occasionally be obscured by a smartphone flash. When positioned in front of the camera lens, attachable lenses that are readily accessible on the market produce the desired result. USB ring flashes and point flashes can be mounted to illuminate the topic. An affordable luxury in smartphone illumination is the Smile MDP frame.

Intraoral smartphone photography

1. Retract the lips and cheek.
2. Disinfect the smartphone. Place it at 45°.
3. Use the chair light to illuminate the scene. For diffused lighting loosely cover the light using a white cloth or tracing paper. To get more texture in the image, place the lamp on the patient at about 90°. You can also use a ring flash on the mobile.
4. Focus on the area of interest. “Lock-focus” if there is an option. Shoot!

Extraoral smartphone photography

- Ask the patient to smile naturally. Judiciously use facial asymmetries.

- Eliminate plaque and. excess restorations before the shoot.
- Centre the nose to the image.
- Use a white or black background
- Place the patient about 50–60 cm in front of the fundus to reduce the shadow [6].
- Place the mobile phone at the level of the patient's eyes.

Conclusion

Dental professionals frequently find the quick pace of innovation in the photographic industry confusing. All dentistry specialties have progressively embraced, standardised, and used digital imaging as a valuable resource. Taking pictures is simple when you have the right tools, the right settings, and the best approaches, boosting your chances of getting good-looking photos. Before a dentist dives into the fascinating area of digital clinical photography, this article offers the very least that he or she should know.

References

1. Galante DL. History and current use of clinical photography in orthodontics. J Calif Dent Assoc,2009:37:173-4
2. Bengel W. Mastering Digital Dental Photography. 1st ed. New Maiden, Surry (UK): Quintessence Publishers, 2006.
3. Alberto C. Digital photography and documentation techniques in dentistry and dental technology. Zerodonto,2013:1:1-103.
4. Daniel R. Technical analysis of clinical digital photographs. J Calif Dent Assoc,2009:37:199-206.
5. Godlevsky LS, Bidnyuk E, Bayazitov N, Kresyun N, Kovalenko A, Lyashenko A *et al*. Application of mobile photography with smartphone cameras for monitoring of early caries appearance in the course of orthodontic correction with dental brackets. Appl Med Inform,2013:33:21-6.
6. Dental Photography, Tricks with a Mobile. Available from: https://www.dentaltix.com/en/blog/dental-photography-tricks-mobile Last accessed on,2020.