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MASTERING THE SHOOTING MODES IN DENTAL CLINICS

Dental Science

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ABSTRACT

With the advancing digital technology, digital camera has become an essential tool in dental clinics as it helps clinicians in keeping records in the form of intraoral and profile pictures of their patients, thus helps in self evaluation of the treatment outcomes, and could also be useful for education purpose. But, most of the clinicians use digital camera on auto mode due to which quality of image gets compromised. Thus, it is essential to understand all the shooting modes of digital single lens reflex camera to enhance the quality of an image of dental patients.

KEYWORDS

INTRODUCTION

In this era of science and technology, photography has emerged as an essential tool in everyone's life. Digitization has made imaging easy and accessible. Digital imaging allows easy communication with laboratory technician and other practitioners also. It also helps in diagnosis and treatment planning of the patient. In tandem with, it helps the dentist to improve their practice by keeping the records of intraoral photographs. However, many dentists are reluctant to put photography into practice because they lack knowledge of basic principles and the essential equipments required for it.**(1)** This article aims to unravel the technical argots about digital imaging with the help of digital single lens reflex camera and to implement those techniques in daily clinical practice.

Factors Affecting Choice of Camera

There are various types of cameras available in the market and it is very important to choose right camera in dental practice. View Camera with a lens in the front, a viewing screen in the back, and flexible bellows in between, is used for commercial photography and landscapes. But, these are large in size and heavy to use. Moreover, tripod is required to place the camera as it provides extra stability. Range finder cameras or point and shoot cameras are compact, lightweight, and easy to handle. In these cameras view finder and lens are in different position due to which parallax error occurs. However, single lens reflex eliminates parallax as it uses lens for viewing and focusing both. Thus, digital single lens reflex cameras are most commonly used in clinical practices because of its compact nature, unlimited accessories and absence of parallax error. **(2, 3)**

Components of DSLR Camera

Camera is an assembly of various components (Fig. 1), each having specific function. Digital single lens reflex camera is made up of body of metal or high quality plastic which provides protection to all the parts inside the camera. An important part of camera in conjunction with body which is required for zooming, focusing, and distortion correction is called lens. It is an assembly of interchangeable lenses with different focal lengths, apertures and other properties. Focusing ring is used to manually focus the lens in DSLR cameras. Macro photography is an essential feature of DSLR cameras based on individual lens used. It is related to close up photography which requires 1:1 magnification in which size of the image formed on digital sensor is same as that of actual size of the object captured. Thus, this property makes DSLR even more advantageous for dental photography. On the top of the body, mode dial (Fig.2) is used to select automatic or manual shooting mode. In the centre of back side of the camera, there is a window that shows the image as seen by camera's imaging sensor. This small window is known as view finder. Flash can be inbuilt or detachable, provides an instantaneous burst of bright light to illuminate a poorly lit scene. Flash Mount (Hot-Shoe) holds an optional flash accessory. There is another section in the camera which holds the batteries and a separate slot where memory cards can be inserted. Power Switch is used to turn the camera on or off. **(3, 4)**

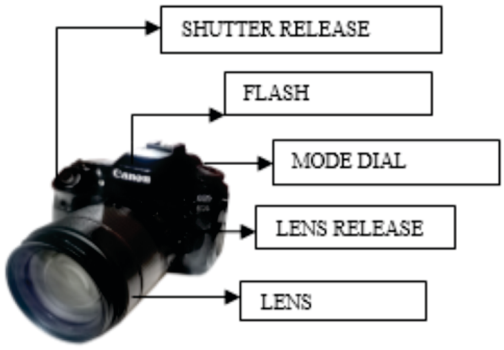

Fig.1 shows parts of camera

Mastering the Manual mode

In DSLR camera, mode dial is labeled with **M** (Manual), **A** (Aperture priority), **S** (Shutter priority)**, P (**Program mode). In Program mode, to achieve correct exposure, appropriate shutter speed and aperture is chosen by camera automatically. However, if shutter speed is chosen by using shutter priority mode, then camera chooses appropriate aperture by itself. Similarly, if photographer sets aperture, camera chooses apt shutter speed by default. However, by using manual mode, user has freedom to set both aperture and shutter speed. This allows full control over the exposure determination. Thus, to master manual mode, understanding of exposure and the three fundamental factors of aperture, shutter speed, and ISO is essential. The correct combinations of three fundamental factors give images with perfect exposure in camera.

Fig.2 shows mode dial

Aperture

The aperture is the opening in the lens through which light is allowed to enter the photo sensor of the camera. The aperture is measured in 'f-stops' and is usually displayed using an 'f-number', e.g. f/2.0 (wider opening), f/2.8, f/4.0, f/5.6, f/8.0 (narrow opening) etc, which is a ratio of focal length over diameter of the opening. Reducing the aperture by one f-stop, i.e. from f/2.0 to f/2.8, halves the amount of light entering the camera.

Fig.3 shows aperture starting from wider opening i.e. f-number f/2.0, then f/2.8, f/4.0 and f/5.6 (narrowest opening in the above image).

Aperture influences the depth of field which suggests the range or distance under the focus. To achieve a large depth of field, a small aperture or large f-number is required resulting in a large distance within the focus (Fig. 4A and 4B).

Fig. 4A shows large depth of field with small aperture

Fig. 4B shows shallow depth of field with large aperture.

Shutter Speed

The shutter speed is the amount of time the shutter stays open when taking a photograph and is measured in fractions of second. A short shutter speed freezes a fast moving subject, a long shutter speed is used to blur a moving subject but a tripod is required to ensure the camera is held steady whilst the shutter is open (Fig.5A and 5B).

Fig. 5A Blurred moving bur with long shutter speed (s=1/25s)

Fig. 5B Freezing moving bur with short shutter speed(s=1/160s)

ISO

ISO scale tells about sensitivity of sensor of the camera to light. With the increase in ISO number, the picture becomes brighter. Thus, for shooting in dim light; high ISO number is required because optimum light is not available to the sensors of camera (Fig.6A and 6B). Similarly, for inside shooting, high ISO number is required as less amount of light is available. Low ISO should not be used inside the clinic without proper lightening as this may result in darker image. It should also be remembered that increase in ISO makes image noisy and granular. High ISO is used only in low light conditions; otherwise it is better to get images at base ISO.

Fig. 6A shows the darker image of the parking area at ISO 800

Fig. 6B shows the brighter image at ISO 3200

All the three parameters that is aperture shutter speed and ISO forms the exposure triangle. Aperture and shutter speed determines the amount of light reaching the photo sensors of camera whereas ISO determines the sensitivity of the sensor to the given exposure of light. **(5)**

Metering

In built metering sensor of DSLR cameras measure the brightness of the subject. In Matrix metering, the brightness is measured in multiple areas of frame separately, then camera corrects the exposure accordingly by adjusting the three parameters that is aperture, shutter speed and ISO. Whereas, spot metering measures the brightness of specific area of the frame and center weighted metering focuses the center of the frame to assess the brightness. It is an inherited feature of cameras to inadvertently set the exposure to 18% gray in reflectivity. For an instance, in a bright sunlight, the camera tends to perceive that under exposure is required, thus image appears darker. Thus positive

compensation (Fig. 7) is required to allow the camera to make the image lighter in appearance. Similarly, in case the darker scene is focussed by the camera, it increases its setting to 18% gray by default to over expose the image. Thus an intentional modification that is negative compensation is required to make image darker in appearance. **(3, 6)**

Fig.7 shows button for exposure compensation

Studio Set Up For Clinical Portrait Image

While using the camera for clinical portrait images, it is essential to follow the simplest studio set up at least, as it helps to achieve high quality images. It consists of black background, silver reflector, flash and camera (Fig.8)

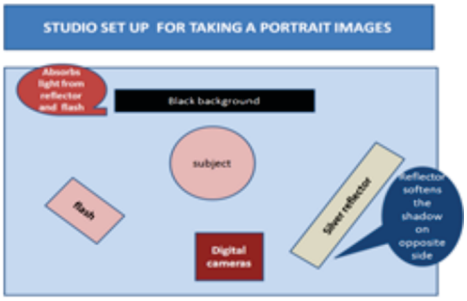

Fig. 8 shows studio set up for clinical portrait

Black background is used to absorb light from the flash and reflector, thus prevent the annoying shadows behind the patient which could be seen in light coloured background. Reflector can be white, silver or gold and helps to fade away the shadows on the opposite side to flash illumination (Fig. 9).

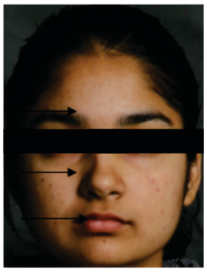

Fig. 9 shows the shadows (arrows) on one side of the face in the absence of silver reflector on same side

For the profile and lateral images, it is essential to use a coloured background and two flashes. **(8)**

Required views as per guidelines of AACD

American Academy of cosmetic dentistry (AACD) suggests 24 views for all the clinical cases, 12 should be taken prior to the treatment and rest after the treatment (Fig.10 and Table 1). **(4, 8)** Prior to capture of images the following guidelines should be followed:

1. Debris like plaque, calculus and other interruptions like saliva etc. should be removed.
2. It is important to follow proper angulations of camera while focussing the particular view.
3. While taking the pre treatment and post treatment images, the background should be same. Preferably, background should be of gray colour because lighter colours are subjected to annoying shadows.
4. Position of camera should not be changed in order to compensate any of the tilt in the occlusal plane of teeth.
5. Patient may require changing the position as per requirement of the view of image required.
6. To obtain high quality images, one should set the camera with optimum value for ISO, Aperture and Shutter speed as provided in Table 1. **(4, 5, 8)**

To sum up, photographs play a significant role in daily clinical practice. But, most of the practitioners are using digital cameras on auto modes due to which their documentation of intraoral and extraoral images is devoid of high quality and required features. Thus, it is essential to understand all the fundamentals of digital cameras which can be incorporated in dental practices as digital cameras are technique sensitive just like any other instrument used in dentistry.

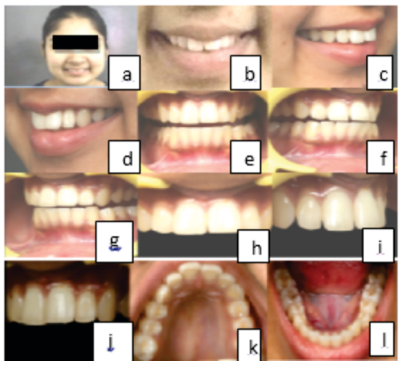

Fig. 10 shows 12 views (a-l) of patient that should be taken post and prior to treatment.

Table 1: 12 Basic shots for patients prior and post treatment recommended by AACD(8)

View	Magnification	Aperture	Cheek retractors	Focal point of camera	Horizontal midline of photo	Vertical midline of photo
Portrait (a)	1:10	f/5.6	-	Interpupillary line	Nose	midline of face
Smile (b)	1:2	f/18-29	-	Centrals and laterals	Incisal plane of upper teeth	midline through philtrum
Smile right (c)	1:2	f/18-29	-	Lateral incisor	Incisal plane of upper teeth	Through lateral incisor
Smile left (d)	1:2	f/18-29	-	Lateral incisor	Incisal plane of upper teeth	Through lateral incisor
Retracted frontal (e)	1:2	f/18-29	yes	Central and lateral incisors	Incisal plane of upper teeth	midline of face
Retracted right (f)	1:2	f/18-29	yes	Lateral incisors	Incisal plane of upper teeth	Through lateral incisor
Retracted Left (g)	1:2	f/18-29	yes	Lateral incisors	Incisal plane of upper teeth	Through lateral incisor
Retracted close up (h)	1:1	f/29-32	yes	Central Incisors	Line bisecting central incisors	Line bisecting the frenum
Retracted close up right (i)	1:1	f/29-32	yes	Lateral incisors	Line bisecting lateral incisor	Line bisecting lateral incisor
Retracted close up left (j)	1:1	f/29-32	yes	Lateral incisors	Line bisecting lateral incisor	Line bisecting lateral incisor
Upper Occlusal (k)	1:2	f/18-29	yes	Bicuspid	Premolar/ canines	Anatomic midline
Lower Occlusal (l)	1:2	f/18-29	yes	Bicuspid	Premolar/ canines	Anatomic midline

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