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Digital Single-Lens Reflex (DSLR) Camera: General Principles and their Technical Considerations to Improve the Technical Skill for Better Diagnosis and Treatment Planning in Orthodontics

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Abstract: ***Dental photography is fastest growing area of the modern dentistry, knowing proper digital photography not only improves diagnosis and treatment planning for orthodontics resident but also improves their future clinical practice. In modern dentistry, lots of photography applications are in used which directly affect treatment outcome and our clinical practice so deeply that we can't ignore them. Knowing basic about DSLR is essential as a resident in orthodontics. Even in the future, including dental photography in regular academic curriculum is need of time for all the dentists.***

Keywords: DSLR, Camera, Orthodontics

1. Introduction

Despite all the hard work that goes into every case, one aspect seems to be missing among many dentists across the globe is proper documentation of their cases. A proper pictorial presentation and their documentation has many advantages. From start of the treatment planning in diagnosis to follow-up and for patient satisfaction point of view photography play very vital role in modern dentistry specially in orthodontics. So, knowing proper digital photography not only improves the treatment planning but also reinforcing the fact that dentistry is not only a science its actually a combination of art and science.

The full name of the DSLR is a digital single lens reflex camera. In this, image we have seen in viewfinder are bounce from the built-in mirror of the camera. Commercially in year 1991, first digital sensor was produced and before that older version of camera with film had been found, that are also known as point-and-shoot camera. The difference between DSLR and point-and-shoot camera is mainly seen in their lens, in DSLR usually have interchangeable lens while point-and-shoot camera have fixed lens. The common confusion encountered by all most all residents before start of their clinical photography is it worth to take picture from DSLR or its just wastage of money. So, without any doubt DSLR is best for now but if we don't know how we can obtain maximum from it, it could be wastage of money. The most common problem every postgraduate's face for not documenting their case are- 1) Expensive digital camera 2) Confusion about which are the best equipment's available for digital photography 3) Inability to understand settings buttons 4) Lack of proper professional training 5) Lack of time 6) Heavy equipment's therefore we need to resolve this complexity in simpler manner. Here in this paper, we only focus on to discuss the basics working principal and their important technical factor about the DSLR camera before using in our regular practice.

2. Discussion

General Working Principle of Camera

Let's begin by taking a detailed look at the ray diagram of DSLR camera.

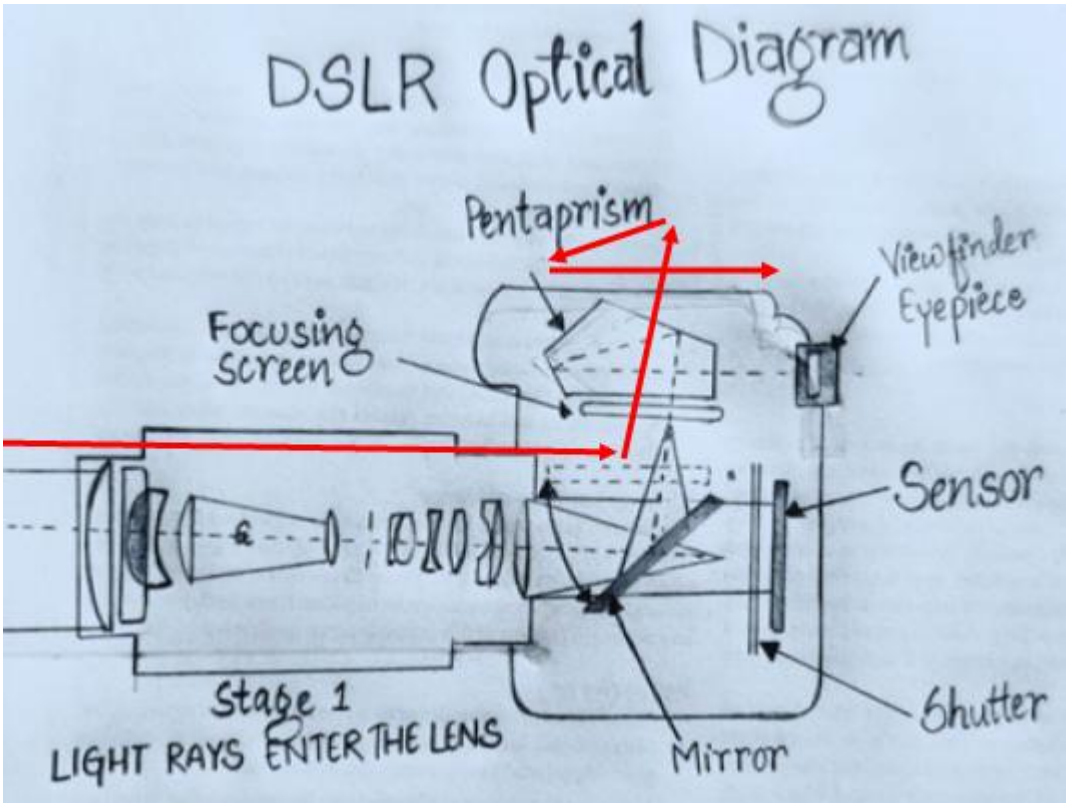


Figure 1: Diagrammatic representation of working mechanism of DSLR Camera, here red arrow indicates the light pathway that enters into the camera, when shutter button is half click

The working mechanism behind DSLR sensor is that when light is entering into the lens it converts the electrical signal to CMOS sensor then electrical signal is then sent to image processor and converted into image data which later saved into memory card (Fig.1). The full name of CMOS sensor is complementary metal oxide semiconductor. So, any image which is recorded by camera has image data which made up of pixels with brightness and color information in that. In short, DSLR camera works by use of a reflex mirror (or pentaprism) which reflect light into optical viewfinder, which allow us to capture the image they are seeing in front of them.

Technical Considerations

DSLR or the Point-and-Shoot Camera Which is Best?

Point-and shoot camera have only advantage over DSLR camera is that they are less bulky in their weight and size while DSLR have many advantages over point-and-shoot camera and the most common are- 1.) photo quality is excellent 2.) imaging sensors are large 3.) speed of the DSLR camera is excellent over other type of camera, speed is measured in (fps) frames per second 4.) we can add additional camera accessory in DSLR like filters and flash etc. So, comparatively DSLR is best over old point-and-shoot camera.

Is More Megapixels Means More Better Camera?

As with the advancement in the technology, currently all the different camera manufacturer are in race to manufacture DSLR with high megapixels, as because recently many mobile manufacturers also start making high megapixels camera in their smart phone, which are particularly good. The fact about megapixels is that in the image with more megapixels we can crop it to more level because you have extra megapixels to play with. Conversely, we can make larger image which have more megapixels. So, it is important to understand that how large do you need your image to be or how small do you want to crop without losing quality, only at that time megapixel matters for clinical photography. Generally, there is no point having camera with more megapixels, which is over 20.2 megapixels, is required for dental photography in orthodontics because we don't require that much of zooming in our image.

Sensor Size and Image Quality

The most important component of the DSLR is their sensor, processor and the lens. Sensors are broadly classified into two type based on their size: 1) Full frame sensor having size of 24mm by 36mm and 2) Crop sensor (example is APS-C sensor of 22.3mm by 14.9mm. In layman term, the larger the sensor better will be the quality of that image.

Use of Dental Photography in Orthodontic [(1)]

These are the common use of dental photography in orthodontics-

1) **Preoperative**: in diagnosis, analysis, treatment planning, patient education, leverage your practice, clinical marketing, referring point
2) **Operative**: progress monitoring by recording steps, self-criticism, lab communication, interdisciplinary communication
3) **Postoperative:** medico-legal proof, record keeping, research, thesis, dental insurance
4) **Others:** comparing cases, educating dental assistants, stock photography etc.

It is worth remembering the proverbialadage, 'a picture reallyis worth morethan a thousand words', especially if onehas to type them. Use of digital dental photography is ideal method for analysing pre-operative with post-operativeoral health status of patient (Fig.2). Dentalphotography in orthodontics should be regarded as a diagnostic tool and should give similar importance aswe give to radiographs, study casts orother investigations and tests. A series of pre-operative images is not only helpful forrecording a baseline of oral health but is invaluable for arriving at a firm diagnosis andoffering treatment options to restore health, function and aesthetics.[1]

The important feature that should beavailable in ideal intraoral photograph for adult patient is [2]:

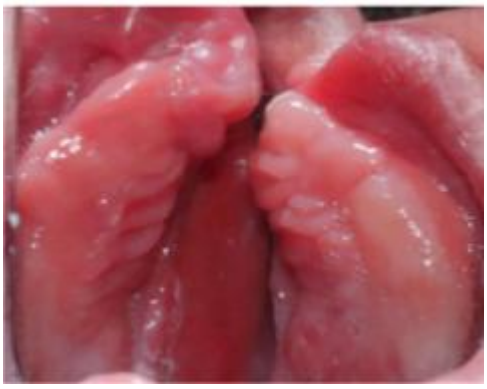
1) Difference between healthy and abnormal gingiva
2) Attached gingiva should show proper texture (stippling)
3) Transition should be present between keratinized and non-keratinized mucosa (cleft patent).
4) Proper enamel characterization should be there (like lobes, mottling, cracks, fracture)

Ideally it is not possible to show all the above feature in single photographbut with experience and proper learning anyone can do it very easily.

Figure 2: Photographic comparison of intraoral and extraoral feature of a baby born with unilateral cleft lip and palatedisorder

Case 1: Pre-Treatment Extraoral Photograph

Pre-Treatment Intraoral Photograph
Post-Treatment Extraoral Photograph



Post-Treatment Intraoral Photograph

3. Conclusion

Dental photography has tremendous penetration and use in orthodontic, and its potential shouldn't be underestimated. With advancement in diagnosis and treatment planning in orthodontic, we have now more than 60-70 applications in dentistry to use. So, it is high time for the orthodontics resident to take dental photography seriously. As Proper documentation by taking excellent image can also open up newer financial opportunity for young resident after their specialization and also enhance the standard of their documentation and thetreatment outcome of various orthodontics problems in their clinical practice.

References

[1] Ahmad, I. Digital dental photography. Part 2: purposes and uses. Br Dent J 206**,** 459–464 (2009).
[2] Ahmad, I. Digital dental photography. Part 1: an overview. Br Dent J 206**,** 403–407 (2009).