

## Clinical Photography in Orthodontics

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### Abstract

### Review Article

Clinical photographs are essential for maintaining patient records, patient education, diagnosis and treatment planning. The application of photography in dental practice is simple, quick and particularly useful in documenting of work, assisting in patient education and helping in clinical investigations, thus benefits dentists and patients. Its widespread application include self-checking of one's own results, illustration of lectures and publications, marketing and accomplishing electronic tele dental systems.

**Keywords:** Orthodontics Photography patient records dental practice electronic tele.

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## 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 uses of photography are emence [1].

High-quality photographs allow the clinician to evaluate both the skeletal tissues and the soft-tissue drape. A photograph provides important visual reference for monitoring growth and developmental changes, providing the patient with a view of the changes and providing the therapist with credible visual material for teaching and research.

Photographs for comparison over time can be obtained only if the conditions under which they are taken are reproducible. The photographic equipment used, the framing of the picture, the scale of reproduction and lighting are constant [2].

### Important terms in photography [1, 3, 4]

- 1) Angle of view: The particular portion of a scene that is covered by a camera lens. The area is determined by the focal length of the lens.
- 2) Aperture: Lens opening. The opening in a lens system through which light passes. The size of the

aperture may be fixed or adjustable. Lens openings are usually calibrated in numbers.

- 3) Back ground: The part of the scene that appears behind the main subject of the picture
- 4) Blow up: An enlargement; a print that is made bigger than the negative or slide.
- 5) Camera angles: Various positions of the camera (high, medium or straight) with respect to the subject, each giving a different view point as effect.
- 6) Contrast: The density range of a negative, print or slide, the brightness range of a subject or the scene lighting.
- 7) Density: The blackness of an area in a negative or print which determines the amount of light that will pass through it as reflected from it.
- 8) Double exposure: Two pictures taken on one frame of film or two images printed on one piece of photographic paper.
- 9) Emulsion: A thin coating of light sensitive material, usually silver halide in gelatin, in which the image is framed on film and photographic paper.
- 10) Exposure: The quantity of light allowed acting on a photographic material.
- 11) Film speed: The sensitivity of a given film to light. It is indicated by a number in ASA / ISO rating, the higher the number, the more sensitive or faster the film.

- 12) Over exposure: A conditions in which too much light reaches the film, producing a dense negative as a washed out print.
- 13) Panorama: A broad view, usually scenic.
- 14) Range finder: A device included on a camera as an aid in focusing.
- 15) Parallax: At close subject distance, the difference between the field of view seen through the view finder and the lens. There is no parallax with single lens reflex lens.
- 16) Shutter: Some movable cover in a camera which controls the time during which light reaches the film.

The recommended principal standard components of an outfit suitable for all aspects of dental photography are:

- 1) 35 mm single lens reflex camera.
- 2) 2) Macro lens of 100 – 135 mm focal length, allowing reproduction on a scale of 1:1 or preferably 2:1
- 3) Lateral flash: Single or preferably double, ring flash can also be used for intra oral photography.

Photographs in orthodontic clinics [5]

#### **Intra-Oral Photographs**

The major purpose of intraoral photograph is to enable the orthodontist

- To review the hard and soft tissue at clinical examinations.
- To record hard and soft tissue condition as they exist before treatment

(Patient with white spot lesions of enamel, hyperplastic areas and gingival cleft are essential to document)

American Board of Orthodontics Requirements for Intra Oral Photographs is [6]:-

- Quality, standardized intra oral prints in color
- Patient dentition oriented accurately in all three planes of space
- One frontal view in maximum intercuspation.
- Two lateral view right and left.
- Optional two occlusal view maxillary and mandibular
- Free of distraction - check retractors, labels, and fingers
- Quality lighting which reveals anatomical contours and makes image free of shadows.
- Tongue retracted
- Free of saliva and bubbles
- Clean dentition.

#### **Photographic methods extra oral photography (portraits and profile photographs)**

Generally 6 views are included in E.O. photography. They are: Left and right lateral views, the

frontal view, the frontal view with head inclined backwards and two fronto-lateral views. All pictures are taken with the camera in the vertical position and at the patients' eye level. Particular importance attaches to the choice and positioning of the background and of the lighting [7].

#### **Background**

The background should be such that it does not interfere with assessment of the profile. It should be unstructured and non-reflective. A grey background is best for general purposes. It does not cause exposure problems or influence the colour rendering. Coloured backgrounds may also be suitable. Illumination Photofloods or electronic flash illumination may be used. The lighting direction and the distance of its source from the background must be chosen so that the shadow of the head falls outside the field of view of the camera. The light should always come from the profile side. This gives good modeling of the angle of the mandible and the ramus [8].

#### **Different views [9, 10]**

##### **Frontal View**

The frontal view is important as it details the appearance of teeth as seen by patient, parent and general public. This view is preferable in particular for general purpose and orthodontics; this is taken in landscape orientation with the teeth in occlusion filling the frame with the occlusal frame horizontal and bisecting the picture. Large ends of larger retractor should be used. Assistant should hold both retractors, pulling all the soft tissue laterally and forward; this makes it easier for the patient to bite together in occlusion and pulls the soft tissue away from the teeth. The midlines if they are should be at the centre of frame. The dental light should always be shown directly into the patients mouth, adequate depth of field is required, so it is important to focus on lateral incisor or mesial of canine to ensure that maximum number of teeth are in focus. The center of the image is the contact point of the upper central incisors. The reproduction ratio is about 1:1.8. The edges of the photograph are in vestibular oris.

##### **Buccal Views**

Importance - useful in giving functional detail of malocclusion. Patient told to close in maximum intercuspation. Occlusal plane should be horizontal. Mirror is always required. A sufficient wide lateral mirror is inserted distal to last tooth turned outside as far as lips and cheek will stretch should not rest on the gingiva. Patient can be asked to hold the mirror. Assistant should hold large end of large retractor. Angle of the camera should be adjusted so that lens is perpendicular to the buccal surface of posterior teeth. The centre of photograph and focus point are around second premolars or first molars, depending upon framing of the image. In reproduction ratio of 1:1, side

edges of photograph mesial to the first premolar and distal to the second molar. If canine to be photographed reproduction ratio of 1:2 selected.

### **Occlusal View Maxillary**

Importance - assessing space requirement in the absence of study models, photographs can be taken to carry out detailed and accurate space analysis. Image should extend from just in front of incisors to at least distal surface of first molars and ideally to include all erupted teeth. There should be no direct view of incisor. Patient position - head tilted backward so that the photographer does not have to twist excessively, instruct patient fully open mouth. Palatal mirror - rests on distal aspect of the last molars and turned down until it touches the incisors. Small end of small retractors under the respective lips and rotates towards midline pulling forward and laterally. The pull is away from the teeth and in an upward direction. Centre of the photograph is a cross-section of the sagittal plane with the connection line between second premolars running horizontally in the middle of the image. Focus on fissure of side teeth. Reproduction ratio is 1:2.

### **Occlusal View Mandibular**

Palatal mirror inserted with the broader end so that mirror rests on distal aspects of last molars, it is turned upward with the mouth wide open until it touches the incisal edges of upper incisors. The patient is advised to raise the tongue and breathe through the nose. The pull of retractor is away from the teeth and in a down ward direction. Centre of the image should be at the intersection of the sagittal plane with the line crossing second premolars, positioned horizontal in the centre of image. Optimum focus is on side teeth. Reproduction ratio - 1:2. Photograph taken with mirror require aperture compensation of +1 to allow more light input.

### **Extra- Oral Photographs**

#### **As For the American Board of Orthodontics Requirement Are**

Quality, standardized facial photographs either in black and white or color Patient head oriented accurately in all three planes of space and in Frankfort horizontal plane. One lateral view, facing to the right; serious expression lips closed tightly to reveal muscle imbalance and disharmony. One anterior view serious expression. Optional one lateral view and or one anterior view with lips apart. Optional one anterior view, smiling. Background free of distractions. Quality lighting revealing no shadows in the background. Ear exposed for purpose of orientation. Eyes open and looking straight ahead, glasses removed.

#### **Positioning of Patient**

Both patient and the clinician need to be positioned correctly in a standardized manner. If there is a height difference between patient and the clinician

any one of them can stand on a platform to raise them to appropriate level camera level at the middle of the face. In extra-oral photography, attempt should be made to focus on the patient's lower eyelid to ensure from tip of nose to ear of patient falls within the depth of field.

### **Frontal View**

Portrait view with the frame extending to just above the top of head and lower frame line around the larynx. Photograph should be symmetrical with the interpupillary line parallel to floor. A focusing screen with grid is very useful. Patient assumes a natural head position and looks straight ahead into the camera. Camera position middle of the face and in portrait format. Space should be left on all sides of the photograph. Light should come diagonally from the front, leaving the patient shadow out of view of the camera. Three types of frontal photographs are usually taken. Frontal at Rest (Fig.6) Teeth in maximal intercuspation with the lips closed even if this strains the patient in case of lip incompetence. This photograph serves as clear documentation of lip strain and its esthetic affect.

### **Frontal Dynamic Smile**

Smiling picture demonstrates the amount of incisor smile (percentage of maxillary incisor display on smile) as well as excessive gingival display.

A close image of posed smile: A close-up image of the posed smile is recommended now as a standard photograph for careful analysis of smile relationship.

### **Profile View**

Usually only one profile (right profile matching up with lateral cephalogram) is taken. For a patient with facial asymmetries both right and left profile should be taken. Frame extending to above the top of the head in front of the nose and below the chin. Back of head is not necessarily required; the remaining free space should be in front of profile. Patient assumes a natural head position and look straight ahead in a relaxed manner keeping jaws closed, and lips also relaxed. Subjects with long hair should always be asked to tuck them behind the ear, so that Frankfort horizontal line can be assessed accurately. Frank fort plane is horizontal and parallel to the horizontal frame of the photograph. Light should always fall on the patient profile (light always from point of nose) advantage: clearly showing mandibular margin and keeping patient shadow out of picture. If portrait is lit from back of head the angle of jaw is not shown clearly, and the nasal labial line will be unflatteringly lit (pouchy cheek).

Importance: Profile can change during orthodontic treatment. Therefore, it is very important to have profile views both before and after treatment.

### Three Quarter Profile

Useful in examination of midface deformities, in surgery of jaw, prosthetics: Portraits should be taken in such a way that the sagittal plane of the patient and optical axis of the camera are approximately 45° to each other. Recommended that the patient turns his or her head away from the camera until the contour of eye furthest away from the camera appears to touch the lateral visible contour of orbit.

### Submental View

It is an optional view taken especially to document mandibular asymmetries. A self-made angled mirror (two folding mirrors with wooden frames), can be used which allows both frontal and lateral view to be photographed separately.

Disadvantage: It takes, longer to set up the mirror than it does to make three separate exposures.

### CONCLUSION

The paradigm shift towards soft tissue has elevated the status of photography in treatment planning, though photography cannot be an alternative for cephalometry in orthodontic diagnosis. Photographs can be used advantageously for epidemiology, screening, initial consultations and also cases where irradiation to the patient is not recommended. Digital photography assumes importance for diagnostic and treatment planning procedures as it is low cost and less technique sensitive when compared to cephalometry.

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