



# CLINICAL DIGITAL PHOTOGRAPHY IN ORTHODONTICS



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Basic Orthodontic Records include three main types of records:

1. **Study models** properly-trimmed, stone-cast moulds of the dentition.
2. **Radiographs** normally a Panorax (OPG) and a Lateral Cephalometric view.
3. **Clinical photographs.**

# Why Take Orthodontic Photographic Records?

Clinical photographs allow the orthodontist to carefully study the existing patient's

- Soft-tissue patterns during the treatment planning stage.
- Assess lip morphology and tonicity, the smile arc and smile esthetics from various angles.
- Assess the degree of incisal show upon smiling.
- For purposes of research and publication, and for lecturing and teaching presentations. and the
- Growing importance of the need for such records for medico-legal reasons cannot be over emphasized.

- ◎ Thus, they allow us to study the patient in a so called “social” setting, and all without the patient ever being present.
- ◎ Such information greatly aids the orthodontist in formulating the best possible treatment plan for each patient, and monitoring them in subsequent follow-ups.

# Why Go DIGITAL?

- One of the major reasons is the ease of use of such cameras, along with the ability to repeat / delete unsuitable images on the spot. There is no need to wait till the film is developed to check your photos.
- Any problems can be easily rectified immediately.

- ◉ Direct digital photography, which converts the images almost immediately into a digital file, has many beneficial advantages in dentistry, such as:
  - Can see images almost immediately
  - Allows for immediate retakes when needed
  - Can make 100% exact duplicates
  - Media can be reused meaning no additional cost of film or its chemical processing
  - Single media can hold many images
  - Ease of manipulation
  - Images can be easily stored and catalogued
  - Images can be instantly forwarded or transmitted to interested parties, such as: patients, labs, colleagues, insurance carriers, and web pages among others

- ◎ Another important advantage is the “Running Cost” issue. Digital camera setups are cost effective no more buying film, no more developing costs and hassles, and no more worries about where to store all the slides and “physical” photographs of your patients
- ◎ The last advantage to mention here is the ability to enhance, or “post-process” your images.

# Clinical Requirements For Photographic Records

- The Digital Camera
- The Lens
- Macro Lens Vs Macro Function
- The Flash
- Ring Flash Vs Point Flash
- The Retractors
- The Dental Photography Mirrors





## Double-ended retractors

The recommended cheek retractors to be used for best results in clinical photography are the **double-ended retractors**



**Figure 6** (Top) Ghost image from glass and image from rear. (Bottom) Sharp image when front silvered surface used

## Dental Photography Mirrors

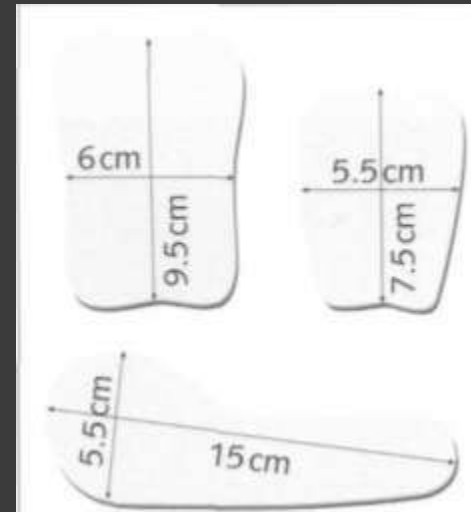
*front-coated  
silvered mirrors  
are highly  
recommended  
over other types.*

# Long-handle Mirrors



it is preferred to use “**long-handle**” mirrors (see **Image**) as they allow better control and handling by the clinician during the occlusal shots. You can find different sizes for use with different patients depending on age and mouth-opening size, but generally, the “**Medium**” sized mirrors would be fit for use with most patients.

- With all mirror shots, it is possible to reduce the problem of fogging by warming the mirror in hot water just prior to use in the mouth.



# NUMBER OF PHOTOGRAPHS

- ⦿ Different clinicians take different numbers of clinical photographs, depending on who you talk to! There is no “standard” set that is universally-approved as a rule of thumb.
- ⦿ However, it can generally be accepted - based on many authorities’ opinions in this field - that a complete “*Clinical Photographic Set*” for any orthodontic patient at any stage of treatment, that would enable the clinician to obtain maximum benefit and information, should include a **minimum of nine photographs; four extra-oral, and five intraoral photographs.**

# EXTRA ORAL PHOTOGRAPH

1. Face-Frontal (lips relaxed).
2. Face-Frontal (Smiling).
3. Profile (Right side preferably - Lips relaxed).
4. (45 °) Profile (also known as 3/4 Profile - Smiling).



# INTRA ORAL PHOTOGRAPHS

There are five essential intra-oral photographs:

1. **Frontal** - in occlusion
2. **Right Buccal** - in occlusion
3. **Left Buccal** - in occlusion
4. **Upper Occlusal** (*using mirrors*)
5. **Lower Occlusal** (*using mirrors*)





- ⦿ Extra-oral clinical photographs are the easiest photographs to take.
- ⦿ They only require proper positioning of the patient and clinician, in addition of course to the digital camera setup itself.
- ⦿ Intra-oral photos require in addition to the camera setup - the proper cheek retractors, dental photography mirrors, as well as a well trained assistant if possible.

# Extra-Oral Photographs

## 1. *Frontal*

*Frontal at rest.*

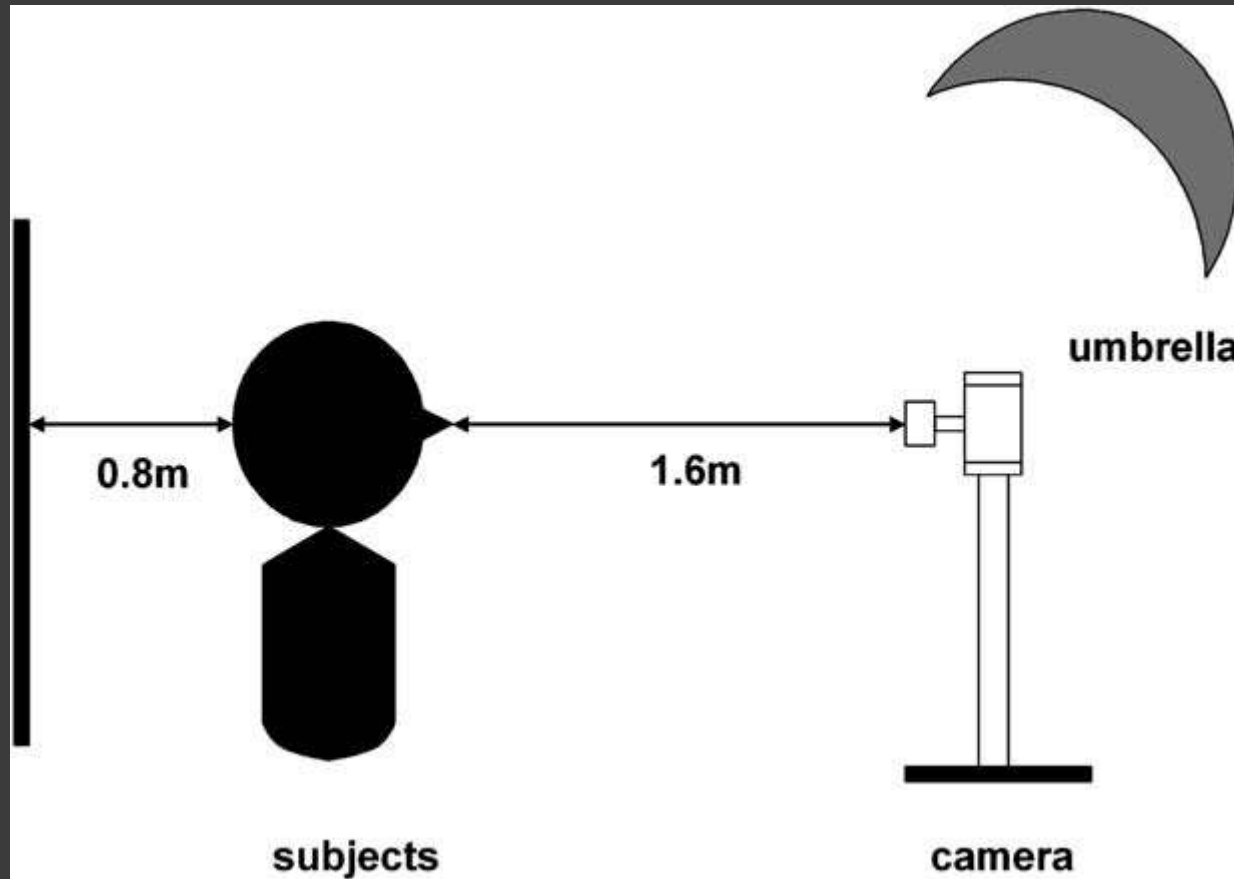
*Frontal view with the teeth in maximal intercuspation with the lips closed, even if this strains the patient.*

*Frontal dynamic (smile).*

*A close-up image of the posed smile.*

- ④ The background used in taking the photos should be either a solid-white background (or a back-lit light-box), or a solid-dark color such as Dark Blue.
- ④ Taking extra-oral photos with the patient sitting on the dental chair or with multiple distracting objects in the background should be avoided.
- ④ The clinician's positioning for these photos would be standing a few feet away from the patient, and at the same eye level if possible. Younger and shorter patients can stand on a special stand to get them to reach a suitable height if needed.

# Method for taking a frontal photo of the patients



# Frontal at rest



- First, the Framing of the shot should encompass the whole of the patient's face and neck with a reasonable margin of space all around.
- This is ensured by holding the camera lens in a *vertical position, and by standing a reasonable distance away* from the patient when taking the shot (4-5 feet). The following general guidelines should also be noted:
  - A. The patient should stand with their head in the **Natural Head Position, with eyes looking straight** into the camera lens.
  - B. The patient should hold their teeth and jaw in a relaxed **(Rest) position, with the lips in contact** (if possible) and in a relaxed position.
  - C. Make sure the patient's head is not tilted or their face rotated to either side; the shot should be taken at **90° to the facial mid-line from the front.**
  - D. Ensuring the patient's **inter-pupillary line is leveled is also very important**

- If lip incompetence is present, the lips should be in repose and the mandible in rest position





Frontal view with the teeth in maximal intercuspation, with the lips closed, even if this strains the patient.

# Frontal dynamic (smile).



- A patient who is smiling for a photograph tends not to elevate the lip as extensively as a laughing patient.
- The smiling picture demonstrates the amount of incisor show on smile (percentage of maxillary incisor display on smile), as well as any excessive gingival display.

# A close-up image of the posed smile



This view  
now is recommended  
as a standard  
photograph  
for careful analysis of  
the smile relationships.

## *Oblique (three-quarter, 45-degree)*

- Patient in natural head position looking 45 degrees to the camera.
- Three views are useful
  - a. Oblique at rest.*
  - b. Oblique on smile.*
  - c. Oblique close-up smile.*

# *Oblique at rest*



- ⦿ This view can be useful for examination of the midface and is particularly informative of midface deformities, including nasal deformity.
- ⦿ This view also reveals anatomic characteristics that are difficult to quantify but are important aesthetic factors, such as the chin-neck area, the prominence of the gonial angle, and the length and definition of the border of the mandible.
- ⦿ This view also permits focus on lip fullness and vermilion display.
- ⦿ For a patient with obvious facial asymmetry, oblique views of both sides are recommended.

# *Oblique on smile.*



Can give valuable information about the smile esthetics' changes pre- and post treatment.

From the Profile photo position, the patient is asked to turn their heads slightly to their right (about 3/4 of the way - hence the name), while keeping their body still in the "Profile Shot" position i.e. Facing forward.

They are then instructed to look into the camera, and then smile.

It is essential that the patient's teeth show clearly when smiling, otherwise the photograph would be of minimum benefit.



- ◉ The oblique view of the smile reveals characteristics of the smile not obtainable through those means and it aids the visualization of both incisor flare and occlusal plane orientation.
- ◉ A particular point for observation is the anteroposterior cant of the occlusal plane.
- ◉ In the most desirable orientation, the occlusal plane is consonant with the curvature of the lower lip on smile (the smile arc).
- ◉ Deviations from this orientation that should be noted as potential problems include a downward cant of the posterior maxilla, an upward cant of the anterior maxilla, or variations of both.

# *Oblique close-up smile*



This view allows a more precise evaluation of the lip relationships to the teeth and jaws than is possible using the full oblique view.

# Profile (Right Side - Lips Relaxed)



- ④ The patient is asked to bodily turn to their left, thus having their right profile side facing the clinician.
- ④ The head should be in the Natural Head Position, with their eyes fixed horizontally (preferably at a specific point at eye-level, or at the reflection of their own pupils in a mirror).
- ④ The wrong head posture can result in confusion regarding the patient's actual skeletal pattern.

- Ideally, the whole of the right side of the face should be clearly visible with no obstructions such as hair, hats or scarfs. The inferior border be slightly above the scapula, at the base of the neck.
- This position permits visualization of the contours of the chin and neck area.
- The superior border should be only slightly above the top of the head, and the right border slightly ahead of the nasal tip.

- ◎ Some clinicians prefer that the left border stop just behind the ear, whereas others prefer a full head shot.
- ◎ Under any circumstance, the hair should be pulled behind the ear to permit visualization of the entire face

# *Profile smile*



The profile smile image allows one to see the angulations of the maxillary incisors, an important aesthetic factor that patients see clearly and orthodontists tend to miss because the inclination noted on cephalometric radiographs may not represent what one sees on direct examination.

# *An optional submental view*



Such a view may be taken to document mandibular asymmetry. In patients with asymmetries, submental views can be particularly revealing.



# INTRA ORAL PHOTOGRAPHS

- It is essential during orthodontic photography for high quality results, that the person doing the photography holds the retractor on the side of interest during buccal shots and holds the mirror during the occlusal shots.
- The reason for this is that the person holding the camera is the only one who knows exactly when the photograph will be taken.
- An additional 4–5 mm of retraction can be achieved by increasing retraction immediately before the photograph is taken.
- This allows the true relationship of the first molars and sometimes the second molars to be recorded without prolonged discomfort for the patients

- The mirror position during the occlusal shots can also be adjusted at the last moment, or the patient can be asked to open momentarily that little bit wider to secure a high quality photograph.
- The occlusal photograph should be taken using a front surface mirror to permit a 90-degree view of the occlusal surface.

# Purpose of the intraoral photographs

- Enable the orthodontist to review the hard and soft tissue findings from the clinical examination during analysis of all the diagnostic data.
- To record hard and soft tissue conditions as they exist before treatment

- Photographs that show white-spot lesions of the enamel, hyperplastic areas, and gingival clefts are essential to document that such preexisting conditions are not caused by any subsequent orthodontic treatment.

# The frontal centered dental photograph



- ⦿ The first photo to be usually taken of the set.
- ⦿ The dental mid-lines are not as reliable for this purpose as they can be shifted to one side or the other depending on the malocclusion present.
- ⦿ The full extension of the sulci is paramount for full visualization and clarity
- ⦿ It shows teeth and surrounding soft tissue and excluding retractors and lips.

- ◉ With the patient sitting comfortably in the dental chair and raised to *elbow-level of the clinician*, **the assistant stands** *behind the patient and uses the first larger set of retractors from the wide ends to retract the patient's lips **sideways and away from the** teeth and gingivae, & slightly towards the clinician.*
- ◉ *This is important to allow maximum visualization of all teeth and alveolar ridges, and also to minimize discomfort for the patient from retractor edges impinging on the gingivae.*
- ◉ The photo should be taken 90° to the facial mid-line & central incisors

# The right buccal dental photograph





- ⦿ Usually the second shot in the series.
- ⦿ The assistant flips the right retractor to the narrower side, while the left retractor remains in place as for the previous frontal shot.
- ⦿ The patient is asked to turn their head slightly to their left so their right side will be facing the clinician.

- The clinician holds the right retractor and stretches it to the extent that the last present molar is visible if possible, while the assistant maintains hold of the left retractor, without undue stretching.
- Again, the shot is taken 90° to the canine premolar area for best visualization of the buccal segment relationship, as this is very important in orthodontic assessment.
- A useful tip would be for the clinician to fully stretch the right retractor *just before taking the shot to minimize any discomfort* for the patient, and achieve maximum visibility of the last present molar, if possible.

# The left buccal dental photograph



- The assistant now switches the retractors with the narrow end on the photo side (patient's left) and the wide end on the other (patient's right). Again, the shot is taken at 90° to the canine-premolar area, and to ensure this and the clinician should move their body slightly to the right while holding the retractor on the photo side, while the patient turns their head slightly to their right.

# Upper Occlusal - Mirror



- ◉ The assistant now switches to the *smaller retractor set and with the* patient's mouth held open, the retractors are inserted in a "V" shape to retract the upper lips *sideways and away from the* teeth.
- ◉ The clinician inserts the mirror with its wider end inwards to capture maximum width of the arch posteriorly, and pulls it slightly downwards so that the whole upper arch is visible to the last present molar.
- ◉ The patient is instructed to lower their head slightly so that the shot can be taken 90° to the plane of the mirror for best visibility.
- ◉ Use the mid-palatal raphe as a guide to get the shot leveled.
- ◉ Minimum retractor show in the image is recommended, and no fingers should be visible at any time.



# Position Of Retractors For Upper Occlusal Shot

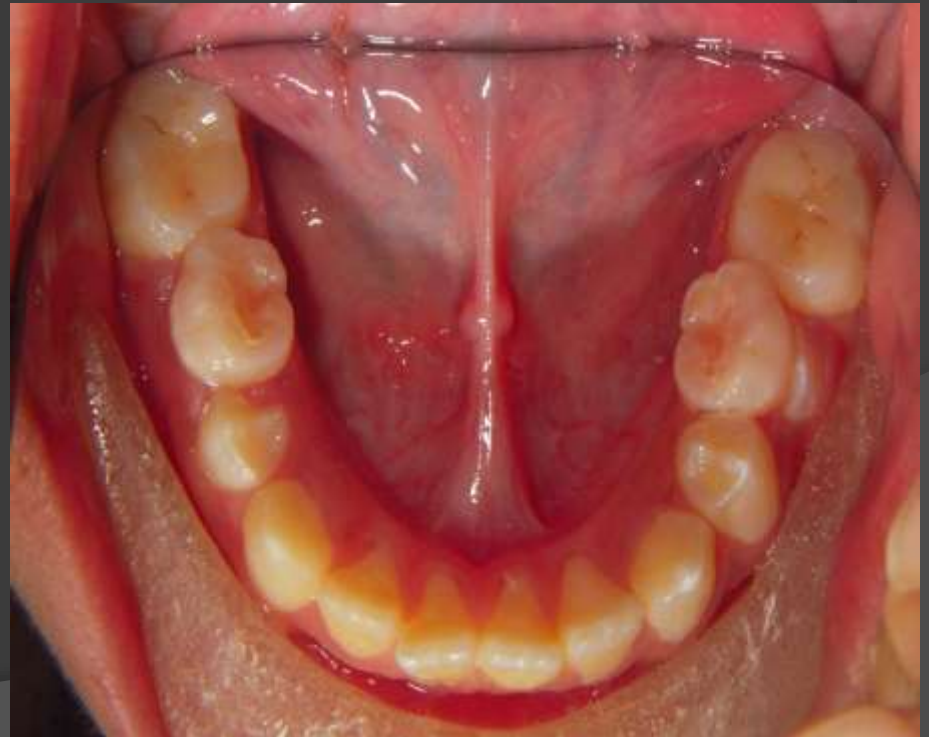


# Upper Occlusal Shot





# Lower Occlusal - Mirror



- ① The assistant would now lower the smaller retractors into a *Reverse “V” shape* to *retract the lower lips sideways and away from the teeth.*
- ② The clinician would now lift the mirror upwards so he/she may visualize the reflection of the lower arch, while the patient is be asked to “lift their chin up” slightly.
- ③ Ideally, the shot should be taken 90° to the plane of the mirror, with the last molar present visible.

- An important issue here would be the tongue position of the patient while taking the photo.
- It is best to ask the patient to “roll back” their tongue *behind the mirror* so that it won’t interfere with the visibility of any teeth, particularly in the posterior area.



**Ideal” Shot :**  
**Tongue Rolled Back,**  
**Midline Centered.**



**Less-than-Ideal” Shot :**  
**Tongue Visible But Not**  
**Obstructing View.**

# Position Of Retractors For Lower Occlusal Shot



# Lower Occlusal Shot





# ORTHODONTICS PEARLS

- The direction of pull of the retractors is always sideways and slightly forward, away from the gingival tissues.
- This maximizes the field of view and minimizes patient discomfort.
- Wetting the retractors just before insertion eases the process of positioning them properly with minimum patient discomfort.
- When taking occlusal “Mirror” shots, slightly warming the mirror in warm water prior to insertion helps prevent “Fogging” of the mirrors which would prevent a clear image.

- ⦿ In certain cases, profuse salivary flow and “frothing” can affect the quality of the image being taken, thus a saliva ejector can be used to eliminate saliva prior to taking each photograph.
- ⦿ During occlusal “mirror” shots, instruct the patient to “open wide” *just prior* to pressing the camera button.
- ⦿ This helps in obtaining the maximum mouth opening at the right moment, and minimizes the patient’s fatigue during the procedure.
- ⦿ It is recommended that all photographic records be taken *before* impression-taking, to eliminate the possibility of impression material being stuck between the teeth or the face during photographic record-taking



- To reflect buccal interdigitation accurately, as much cheek retraction as possible is needed, or one can use a mirror to gain a more direct view.
- A 45-degree view from the front makes a Class II malocclusion appear to be Class I.
- Because occlusal relationships are captured more accurately on casts, mirror views of the lateral occlusion are usually not absolutely necessary.

# HOW TO IMPROVE IMAGE QUALITY

- ⦿ Use of an aspirator
- ⦿ Timing of photographs
- ⦿ Tongue retraction
- ⦿ Image reproducibility
- ⦿ File size of digital photographs
- ⦿ Avoid noise in the photographs

THANK YOU