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# The value of clinical photography

**Abstract:** In the ever-evolving field of orthodontics, the integration of high-quality photography into orthodontic practice remains indispensable. This article provides some key pointers to help with good photography during the provision of orthodontic treatment.

**CPD/Clinical Relevance:** It is important for clinicians to be aware that high-quality photography is an essential aid in treatment.

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In the ever-evolving field of orthodontics, clinical photography is long-established as a powerful tool that not only aids in diagnosis and treatment planning, but also plays a pivotal role in patient communication and documentation. As technology continues to advance, the integration of high-quality photography into orthodontic practice remains indispensable.

## **Diagnosis and treatment planning:**

*capturing the essence of the malocclusion*

Clinical photographs are the initial stepping stone towards comprehensive orthodontic care. They provide a visual snapshot of a patient's oral condition, offering an unprecedented level of diagnostic precision. Orthodontists can meticulously analyse tooth alignment, occlusion, facial proportions, and the health of the hard and soft tissues. With this visual aid, a more accurate diagnosis is achieved, enabling tailored treatment plans that address each patient's unique needs.

## **Progress monitoring:**

*the visual timeline of treatment*

One of the most crucial applications of clinical photography lies in tracking

progress throughout the orthodontic journey. Consistently taking images allows orthodontists to create a visual timeline of changes in the malocclusion, tooth movements achieved, and any skeletal alterations. This invaluable resource permits in-depth assessments of treatment efficacy, aiding in the modification of strategies and ensuring optimal results.

## **Communication with patients and colleagues:**

*visual storytelling to aid understanding*

Clinical photographs serve as powerful tools for communication. They enable orthodontists to engage in meaningful discussions with patients and their parents, as well as collaborate seamlessly with general dental practitioners. By seeing the changes taking place, patients gain a better understanding of the process and are more likely to stay motivated and engaged throughout treatment. Furthermore, general dental practitioners benefit from clear, visual records when seeing patients for extractions or support in optimising

and maintaining oral health, thus enhancing the coordination of care.

## **Legal protection:** *a prudent record for contingencies*

Clinical photographs create a secure, long-term record of a patient's occlusion at all phases of the treatment journey and in retention. This photographic documentation can be indispensable for legal purposes, safeguarding both the practitioner and the patient's interests.

## **Education:** *teaching at the chairside and beyond*

Clinical photographs are invaluable for teaching and learning, allowing students and practitioners to understand complex cases, treatment outcomes, and the subtleties of orthodontic principles. Additionally, these images contribute to the broader orthodontic community's knowledge, and serve as visual aids in academic settings.

## **Capturing the presenting condition:**

*justifying the commencement of care*

Clinical photographs provide baseline records prior to any treatment commencing. They facilitate an informed discussion with the patient regarding the necessary pre-conditions for commencing orthodontic treatment safely. Namely, an immaculate standard of oral hygiene and absence of active disease. In addition, they can provide a point of comparison with the outcomes achieved through treatment, and any pertinent changes can be explored with the patient.

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## Photographic equipment

### Camera

The ideal camera setup for clinical photography is a digital single lens reflex camera (DSLR) with a suitable ring flash. This setup allows flexibility and customization for a consistently high quality of digital images.<sup>8</sup>

### Lens

For enhanced close-up photography, the DSLR camera must be coupled with a macro lens to provide better resolution of the structures in the oral cavity.<sup>1</sup>

An appropriate lens would have the features below:

- An ideal focal length in the range of 90–105 mm;
- Capable of producing magnifications of up to 1:1;
- Minimum working aperture of at least F22 for optimum depth of field.

### Flash

A ring flash, encircling the camera lens, produces an even distribution of light and eliminates harsh shadows making it ideal for photography of the oral cavity without blurring or ghosting. Dual flashes are an alternative, which consist of two strategically positioned flashes, offering a more dynamic and sculpted lighting effect.<sup>1</sup> This setup enhances depth and texture, although mastering the balance between the two light sources may require additional experience. The choice hinges on whether the photographer seeks uniformity and simplicity (ring flash) or a nuanced, and more customizable effect (dual flash).

### Retractors

Double-ended retractors are recommended, and it is crucial to choose retractors that are the correct size and shape. It is essential to ensure that the assistant pulls the retractors away from the teeth and gingivae to avoid them being obscured by the lips and cheeks. There is a tendency for inexperienced assistants to pull back on the retractors while they stand behind the patient. This serves to only pull the soft tissues onto the areas of interest. This must be corrected, and the appropriate forwards and outwards action instituted.

### Mirrors

Optimal image quality and even distribution of light make front-surface mirrors the preferred choice. These mirrors avoid the ghosting issues seen with second-surface mirrors. It is preferable to use mirrors that come equipped with a long handle, granting photographers



Figure 1. Frontal with soft tissues in repose.



Figure 2. Frontal smiling.

precise control over mirror positioning, especially during occlusal shots. Various sizes are available to cater to patients of different sizes and variations in inter-incisal opening.

## The orthodontic photoset

There is no set standard for what an orthodontic photoset should include; however, national guidelines from the Institute of Medical Illustrators<sup>2</sup> suggest that a complete orthodontic photographic set should include a minimum of nine photographs: four extra-oral and five intra-oral views. Most orthodontists should take a greater number of extra-oral photographs than stated in these guidelines, and the photoset below is recommended as the minimum for any orthodontic case.



Figure 3. Profile in repose.



Figure 4. Profile smiling.

## Extra-oral photography

Extra-oral photos should consist of:

- Frontal with soft tissues in repose (Figure 1);
- Frontal smiling (Figure 2);
- Profile in repose (Figure 3);
- Profile smiling (Figure 4);
- Three-quarter view in repose (Figure 5);
- Three-quarter view smiling (Figure 6);
- Three-quarter profile view smiling with eyes to the camera (Figure 7).

### Frontal with soft tissues in repose (Figure 1)

- Ensure that the patient is sitting or standing upright, looking directly into the lens.
- The head should be in natural head position (see below) and the soft tissues relaxed and in repose.
- The median plane of the patient should be centred in the frame, typically with the interpupillary line level unless there is significant asymmetry present.

- The lens should be focused on the outer canthus of one of the eyes.

#### Frontal smiling (Figure 2)

- Positioning should be same as for the frontal photo in repose.
- Patient should be smiling naturally with teeth visible to allow for assessment of incisor show. A reproducible posed smile should be captured.

#### Profile views (Figures 3 and 4):

- Ensure the patient is standing or sitting with their eyes focused at a distant point on the horizon, or looking into their own eyes in a mirror placed at eye level.
- Ideally the whole side of the face being photographed should be visible. The patient's ear and tip of their nose should be in frame.
- The lens should be focused on the outer canthus of the eye.

#### Three quarter views (Figures 5–7)

- Ensure the patient is standing or sitting upright and their eyes are fixed horizontally, looking directly ahead.
- The median plane of face should be 45° to the camera axis. When positioned correctly, the outer canthus of the eye furthest from the camera should only just be in view.
- The outer canthus of the eye closest to the camera should be the point of focus.

#### Tips for extra-oral photographs<sup>1</sup>

- The background should be solid black or white in order to avoid any distractions. If a white background is used, ensure even lighting to eliminate any shadows.
- All views should be in portrait with the top of the head and the cervico-mental (chin–throat angle) in view.
- The head should be in natural head position, either by asking the patient to focus on a distant point on the horizon or having them look at their own eyes in a mirror.
- Glasses should be removed as they can be distracting and fashions may change, and so extra-oral photographs may be dated by their presence.
- Hair should not obscure the face or the ears.
- The photographer should be standing a few feet away from the patient and ideally at the same eye level as patient. This can be achieved through the use of steps, or with both the photographer and patient sitting on chairs.



Figure 5. Three-quarter view in repose.



Figure 6. Three-quarter profile view smiling.

### Intra-oral photography

Intra-oral photos consist of:

- Frontal in occlusion (Figure 8);
- Right buccal in occlusion (Figure 9);
- Left buccal in occlusion (Figure 10);
- Upper occlusal (Figure 11);
- Lower occlusal (Figure 12).

#### Frontal in occlusion (Figure 8)

- Ensure the patient's head is at the level of the clinician's elbow.
- The assistant should stand behind the patient and use the vertically wider ends of the retractors to retract the soft tissues laterally and anteriorly away from the teeth and gingivae towards the clinician.
- Ensure the teeth are in occlusion in intercuspal position, unless intentionally otherwise desired.
- The midline should be centred in the frame.
- The photograph should be taken perpendicular to the facial plane.
- The occlusal plane should be horizontal.
- The lens axis should be level with the occlusal plane and focus should be on the lateral incisors.
- There should be equal and maximal view of the posterior dentition on either side.
- The lips should be retracted out of shot.

#### Right and left buccal in occlusion (Figures 9 and 10)

- Ask the patient to fully turn their head to the side not being captured, so the side being captured is facing the clinician.
- Use the vertically wider side of the retractor on the side not being



Figure 7. Three-quarter profile view smiling with eyes to the camera.

captured. This should be angled such that a 'backdrop' of mucosa, rather than retractor, is seen behind the teeth in the photograph.

- Use the horizontally wider end of the retractor on the side being captured and pull back along the occlusal plane until at least the entire distal aspect of the first permanent molar can be seen.
- The occlusal plane should be horizontal.
- The lens axis should be in line with the occlusal plane with the lens focused on the canine.
- There should be full exposure of the gingivae.

#### Upper occlusal (Figure 11)

- The patient should be instructed to tilt their head and chin up.
- Get an assistant to insert small retractors in a 'V' shape to retract the upper lip, pulling superiorly and anteriorly. The



**Figure 8.** Frontal in occlusion.



**Figure 9.** Right buccal in occlusion.



**Figure 10.** Left buccal in occlusion.

retractors should be out of shot and a mucosal 'backdrop' should be seen behind the upper incisors.

- The clinician should insert the wider end of the mirror into the mouth, as far posteriorly as necessary to capture the entire maxillary dentition.
- The mirror should be angled 45 degrees to the occlusal plane and the lens axis 45 degrees to the mirror. This will give a true 'plan view' of the dentition.
- The mid-palatal raphe should be in the centre of the photograph.
- Do not rest and lever the mirror against the upper teeth.
- Just before the photograph is taken, the patient should be instructed to open 'twice as wide' to gain a further few millimetres of opening.

**Lower occlusal (Figure 12)**

- The assistant should insert small retractors in a reverse 'V' shape to retract the lower lip, pulling superiorly and anteriorly. The retractors should be out of shot and a mucosal 'backdrop' should be seen behind the lower incisors.
- Instruct the patient to lift their chin up.
- The mirror is placed in the mouth and



**Figure 11.** Upper occlusal. Note the mucosal backdrop behind the upper incisors, the plan view of the occlusal surfaces, and maximal capture of the entire maxillary dentition.



**Figure 12.** Lower occlusal. Note the mucosal backdrop behind the lower incisors, the plan view of the occlusal surfaces, and the maximal capture of the entire mandibular dentition. The tongue is kept away from the occlusal surface of the teeth so as to not obscure them.

angled upwards to ensure maximum visualization of the arch posteriorly.

- The angle should be at 45° to the occlusal plane, with the bottom of the frame parallel to the labial surface of the central incisor.
- Aim to capture the entire mandibular dentition.
- Instruct the patient to roll their tongue back behind the mirror and away from the teeth, unless it is already positioned in such a way that the teeth are not obscured.
- The midline should be in the centre of the photograph.

**Tips for intra-oral photography<sup>1</sup>**

- Use the largest retractors and mirrors possible. Virtually all but the very youngest patients can tolerate larger retractors.
- Instruct the assistant to pull the retractors laterally and away from the teeth. Apply a final retractive stretch to the tissues just before capturing the photograph to ensure maximum display.
- The soft tissues respond best to slow,

gradual and purposeful manipulation. Rapid pulling in an effort to maximize retraction will not have the desired effect.

- Wetting the retractors aids in placement and minimizes patient discomfort.
- The mirror should be warmed with hot water and dried to avoid condensation forming on it when it is placed in the mouth.
- For occlusal views, the mirrors should be angled 45 degrees to the occlusal plane and the camera should be angled 45 degrees to the mirror, which results in an image that gives a true plan view of the occlusal surfaces.
- For buccal photographs, avoid taking the photograph from closer to the midline in an effort to maximise capture of the molar teeth. This leads to an inaccurate representation of the buccal segment relationships.
- The teeth must be rendered dry through use of high-volume suction. The patient should be intermittently asked to hold the suction tip so that it is in reach of the clinician.

**Conclusion**

Clinical photography is an indispensable tool in orthodontic practice. It enables orthodontists to achieve accurate diagnoses, effective treatment planning, and enhanced communication with patients and colleagues. Embracing clinical photography is a necessity for orthodontists aiming to provide the best possible care.

**Compliance with Ethical Standards**

**Conflict of Interest:** The authors declare that they have no conflict of interest.

**Informed Consent:** Informed consent was obtained from all individual participants included in the article.

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**Further reading**

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