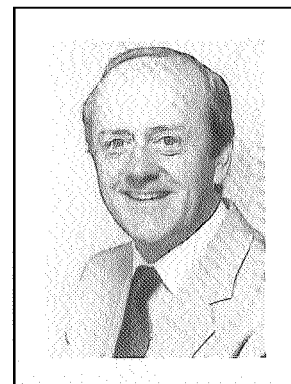


Clinical orthodontic photography

Part II - Facial photography

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Abstract: The facial photograph is an essential element of orthodontic treatment planning and assessment. For realistic use of facial photography in orthodontics the quality of the pictures must be excellent and this quality must be maintained indefinitely. Appropriate selection of equipment and a standardised routine for taking photographs are necessary to achieve consistency. The second article in this series describes the equipment used by the author for facial photography and the technique for obtaining such pictures.

Reference: Aust.Orthod.J. 10(2): 114-118 (1987)

MeSH words: Photography

Key words: Facial photography, film, camera, background, illumination

INTRODUCTION

Whilst intraoral photographs can be regarded as a useful adjunct to orthodontic records and presentations, a set of properly taken facial photographs constitutes an essential element of the orthodontic assessment. Without them, complete treatment planning and evaluation are impossible.

Comprehensive and sympathetic treatment planning requires close consideration of facial type and features. Important facial details are obtained from the lateral cephalometric radiograph, but this records misses the vital information of how that person appears to the world.

Photographic views also reveal facial changes which have occurred during orthodontic treatment. As some of these changes are treatment-induced it is of paramount importance that we recognise and record them.

Although there is now greater awareness of the face in orthodontics one still sees cases presented with an emphasis on dental changes and little or no reference to facial form or alteration. A case presentation without facial photographs is incomplete at best. For facial photographs to be successfully utilised, they must be clear, undistorted and consistent both in quality and magnification. Realistic before and after comparisons are not possible otherwise.

The criteria for good facial orthodontic photographs remain the same as for intra-oral views (listed in Part I of this series of articles).

These are:

1. Sharp definition with main subject material in focus.
2. Good depth of field.
3. Accurate colour rendition (if colour film used).
4. Correct illumination.
5. Good framing.

Readers are referred to Part I for further details.

SPECIFICATIONS

The author prefers a group of four photographs to capture the essential facial characteristics of a given patient (Figure 1). These four views are:

1. Frontal view (lips relaxed)
2. Frontal view (smiling)
3. Profile view (lips relaxed)
4. $\frac{3}{4}$ view (smiling)

This set gives an overall picture of the patient's facial appearance and reveals essential features such as symmetry, balance, proportions, nose-lips-chin relationship, dental and gingival display, smile line and dental

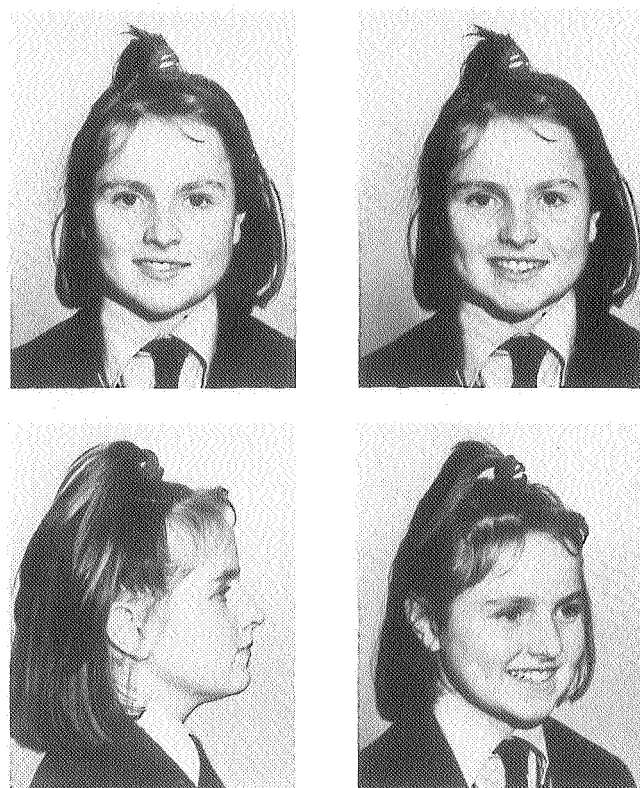


Figure 1. Set of four facial photographs

aesthetics. It also conveys an indication of facial type and pattern which can help confirm the cephalometric appraisal. The $\frac{3}{4}$ view gives an added dimension to the more 'clinical' frontal and lateral aspects.

The photographic system chosen and the technique used must produce consistently excellent and dependable results for the full benefit of facial orthodontic photography to be enjoyed. The author's system and technique will be described.

Choice of film

The clinician is faced with two choices concerning the type of photographs selected for the purpose. The first relates to whether *prints* or *slides* are desired. The second is whether *colour* or *black and white* prints are preferred.

Whilst transparent slides are useful for lecture purposes, the size of the image thereon makes their clinical use limited. It is vital for proper treatment planning to use an image size which is easily discerned. Projection of the slide for this purpose would be possible but not clinically practical. Prints from a more useful vehicle for facial assessment. As slides can be made very easily from prints, there is no disadvantage for lecture preparation purposes.

The question of black and white versus colour is not so clear and ultimately it comes down to the clinician's preference. It can be argued that colour introduces an 'emotional' element to the photograph which distracts the viewer from the important 'clinical' information. This is no doubt true, however it may be argued whether it is, in fact, desirable to filter out this added perspective. After all, colour photography better mimics that person as the world sees them.

An additional factor concerns processing. Most commercial photographic outlets are geared only to colour. Black and white processing is handled mainly by 'professional' laboratories. The cost through this avenue is unfortunately much higher than for commercial colour processing.

The author uses colour print film for ease of processing, availability and dependability (Kodacolor** 'Gold'™ print film, ASA 100). Use of high speed film invariably leads to a loss in clarity and definition due to larger grain size. When enlargements of such prints are made (for lecture or display purposes) detail and clarity can suffer.

Selection of equipment

For facial photography, *a separate camera and flash system in addition to that used for intra-oral photography is strongly recommended.* Each system has its own requirements for lens adjustment, illumination and film type used. Compromise is made on both sides if the same system is utilised for each task.

Two separate sets enables each system to be fully 'pre-set'. Firstly, this saves much time in setting up. Secondly, the actual photograph taking is automated, a vital step in achieving the consistency important for our purposes.

As stated in the previous article, long-term consistency is achieved only when the one operator takes the photographs. Delegation of this role to staff will inevitably lead to inconsistencies, both in the short and long term. This problem becomes more obvious on inspection of facial photographs taken two years apart where different staff members have taken the pictures.

EQUIPMENT

The author's camera assembly (camera body, lens, flash unit and flash mount) is shown in *Figure 2*.

Camera Body

The camera body itself need not be sophisticated nor highly automated. Bodies currently available often have facilities such as programmed aperture and speed settings which are not required for the standardised procedures required in orthodontics. If the camera is to be used only for clinical purposes, purchase of a basic camera body through the second-hand market is advised.

The only specifications for the camera body are that:

- (a) it houses 135mm film.
- (b) its flash shutter speed is 1/60 second or faster.

- (c) it permits through-the-lens viewing.
- (d) it must be compatible with the automatic stop-down mechanism of the lens.
- (e) it must facilitate film speed (ASA) variation.

The author's camera body† meets these specifications.

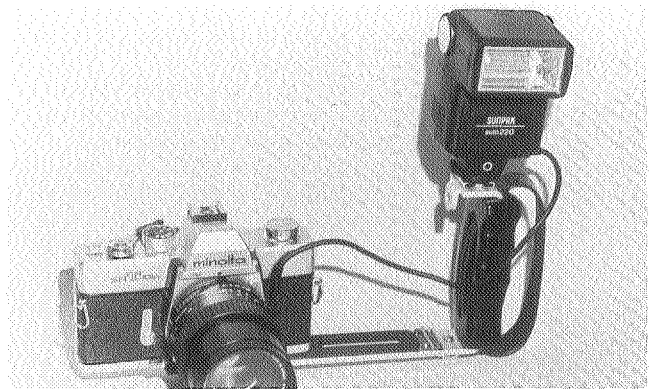


Figure 2. Camera - flash assembly

Lens

It is generally accepted that the ideal lens for portrait photography has a focal length near 100mm. A shorter focal length, such as 50mm, will produce distortion of the subject which is unacceptable for facial photography. In addition, to fill the frame adequately using a 50mm lens, the camera needs to be very close to the subject. This proximity engenders a degree of intimidation which further 'distorts' the patient. A long focal length, (greater than 135mm) alters perspective by flattening facial features excessively.

The 100mm lens facilitates facial photography at a comfortable distance (around 1.5 metres) which is also the normal 'conversation' distance. The resultant views have a perspective which relates to this level of communication and is appropriate for our purposes.

Unlike intra-oral photography where close-up focussing necessitates the use of a macro lens or extension bellows, facial photography simply requires a standard lens. The lens must couple with the camera body to facilitate automatic stop down. This permits framing and focussing at the widest aperture for optimal lighting. The diaphragm then closes down to the preselected stop the instant before the shutter is released. The appropriate aperture range for good depth of field with sufficient lighting is between f(11) and f(16). The lens must encompass these f stops.

Naturally, lenses vary greatly in quality. Whereas one can save money by investing in a less sophisticated and less expensive camera body, it makes sense to spend more on a lens of higher quality. It is recommended that the better-known makes of lenses be chosen. The author's lens† matches the camera body.

Background

A quiet, neutral, undistracting background is important in orthodontic facial photography. The background must be wide enough so that its edges are not visible within the viewing frame. It must be long enough so that subjects of varying heights can be accommodated.

It should be located around 1.5 to 2 metres behind the subject. This will permit proper placement of the background illumination.

The texture characteristics of the background material should be flat. Any reflective surface, such as a gloss painted wall, will create direct reflections which tend to silhouette and darken the subject. Effective background materials include flat painted surfaces and art paper. The author uses a flat woven fabric Holland blind which incorporates the convenience of storage if needed. The

** Kodacolor is a photographic film produced by Kodak (Australasia) Pty Ltd, Melbourne, Australia.

† Minolta SRT101b with 100mm Rokkor lens

colour of the background should be in the mid range, such as mid grey or mid blue. Light coloured backgrounds tend to silhouette the subject and dark backgrounds camouflage dark hair.

Illumination

As with all photography illumination is a key element. For our purposes it is important that the subject be well-lit and that the shadows produced, either on the subject or in the background, do not distract the viewer.

A choice exists between using flood lamps or an electronic flash. Flood lamps have the advantage that the operator can see the lighting and shadows before the event. There are, however, two important disadvantages. Firstly, photofloods have a tendency to dazzle the subject and thus introduce an unwanted side-effect, usually anxiety. Secondly, photofloods are not as powerful as an electronic flash and the required aperture is too large resulting in a diminished depth of field. An electronic flash, synchronised to the camera is a more appropriate lighting system for orthodontic purposes.

There are many ways in which this can be set up. Trial and error will dictate which arrangement of main and auxiliary flash units works best. It will depend on several factors peculiar to each situation, such as strength and direction of natural lighting, reflective characteristics of nearby walls and ceiling and available mounting positions for auxiliary units.

The author uses one main flash unit connected to the camera plus two 'slave-driven' auxiliary units, one to boost the main flash and the other to 'wash' the background of unwanted shadows.

Main flash unit

If the flash unit is attached to the camera body via the hot-shoe or close to the lens (such as a ring flash) the direction of the light beam will be too central to the subject's face and eyes. A shiny face and 'red-eye' (caused by the direct reflection from the retina) will result. In addition, the ring-flash suffers the same short-comings as described in Part I, that is, it will produce a shadowless, flat picture without 'texture' or modelling and therefore less interesting.

An effective arrangement is the placement of the flash unit (point source) on a right angle bracket. This locates the light source at a distance of around 20cm from the lens-subject axis. The flash unit is connected to the camera body via a synchronisation cord (Figure 3).



Figure 3. Flash unit mount. Note : Synchronisation cord

With the camera held vertically, the flash unit is positioned at '11 o'clock' from the subject's viewpoint. From this position the main lighting strikes the subject from above and from the left (Figure 4). This is the ideal lighting direction - slightly downward directed beam best mimics the direction of natural outdoor illumination. Should there be a shadow cast on the background, it will appear at the back of the head, not near the profile.

The power of the main flash unit should facilitate the use of an aperture for these photographs of around f(11) or f(16). The appropriate guide number for the flash for our purposes should be around 22. The guide number is found by consulting the table on the flash unit itself (Figure 5). It is calculated from the aperture and distance readings at the ASA value of 100. Multiplying the aperture for any given distance by that distance (in metres) yields the guide number for that flash unit.



Figure 4. Camera - subject relationship. Note : Main flash unit (arrow a), Background flash unit (arrow b), Background (arrow c)

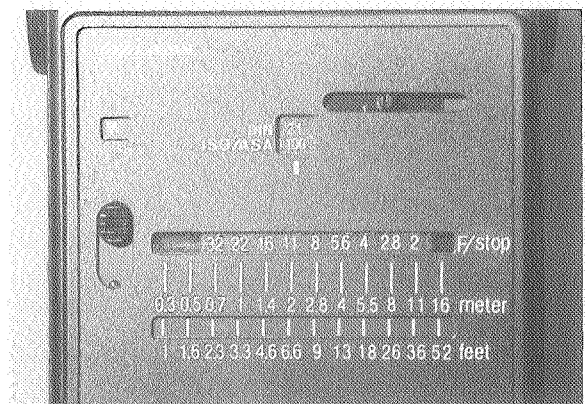


Figure 5. Table on main flash unit

Although most flash units have an 'Automatic' setting, the Manual mode is appropriate for our standardised task. Generally, 'Auto' settings work with wider apertures than for our needs, with consequent depth of field shrinkage.

Auxiliary Flash Units

Any number of remote 'slave-driven' flash units can be placed to augment the main flash or to eliminate unwanted shadows. These are activated via a photo-electric cell (slave unit) and fire simultaneously with the main flash unit. Their advantage is that no physical connection to the camera is required and their positions can be experimented with until correct.

An integrated slave-flash unit (Figure 6) which runs off mains power, can be used. Alternatively a simple slave attachment can be connected to any flash unit (Figure 7). The advantage of the integrated unit is that it is wired directly into the electrical system and thus obviates the need to replace batteries.

An effective position for an auxiliary flash is at the height of the main flash unit but on the other side of the



Figure 6. Integrated slave-flash unit

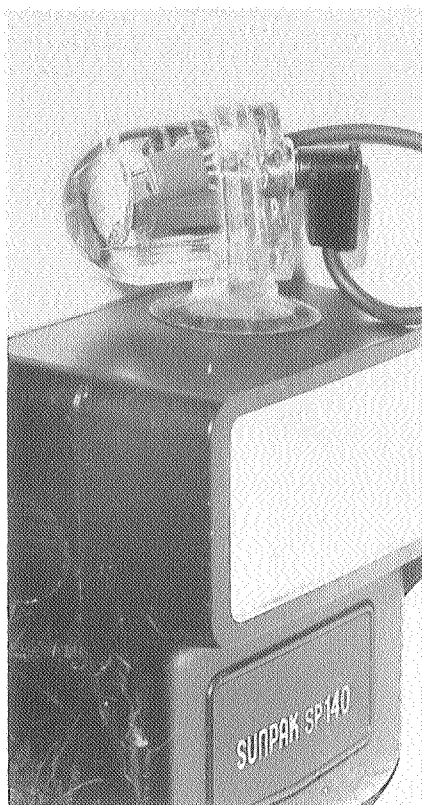


Figure 7. Slave attachment connected to flash unit

camera. In this position it will soften some of the harsher shadows caused by the main flash unit. It is important that this flash does not overpower the main unit. It should be regarded as a 'fill-in' flash to soften but not obliterate the shadows. If too strong it can be "quietened" simply by taping some cotton gauze over the front of the unit (Figure 8).

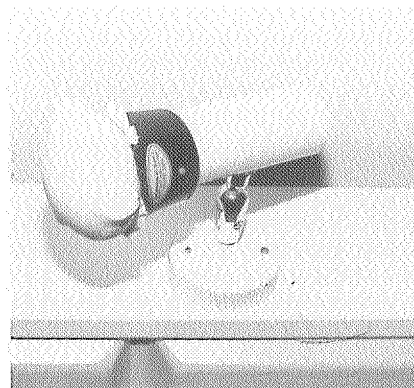


Figure 8. Gauze "baffle" on integrated slave-flash unit

Obliteration of background shadow, however, is desirable. This is achieved with an auxiliary flash unit positioned behind the subject and directed on the background. The ideal position is immediately behind the patient's back or shoulders and directed straight towards the background which should be approximately 2 metres from the flash unit. This may require the use of a portable stand. Mounting on a nearby wall or ceiling is often more convenient but will produce a gradation of illumination from one side or end of the picture to the other. Provided the effect is gradual, this is acceptable.

AIMING, FRAMING AND SETTING THE SUBJECT

For consistent and reproducible picture taking it is important that a routine is followed in setting up the shot. The camera must be aimed horizontally at the subject's face. Subjects taller than the operator will need to sit on stool. A dental stool is ideal as it can be raised, lowered and swivelled. A short subject will need boosting to a higher level. Having the small patient kneel on the stool effectively achieves this. The patient must be able to hold their position in a comfortable way otherwise it will affect posture and facial expression.

Correct image size is obtained by setting the focus ring on a fixed position for all subjects. Focus is achieved by moving forward or back until the subject (front of the face) is in sharp focus. This will standardise the enlargement of every photograph. The setting on the author's (100mm) lens is 1.4 metres. In the profile view of some larger adult subjects the back of the head or hair is 'chopped off'. This compromise is preferable to a wide setting which would accommodate all sizes of patients but render the image-size of the young, small patient too small.

The subject must be centred within the frame. The distance between the top of the head and top edge of the frame should equal that between the chin and the lower edge of the frame. This applies in both frontal and profile views.

The eyes should be in the same vertical position in all photographs in the one series.

The camera must be held in a true vertical position for all facial pictures. It is useful to have a vertical reference line close to but just outside the background. The edge of the background itself may be suitable. The vertical edge of the viewing frame can be lined up with the vertical reference line. The camera is then aimed at the subject, leaving the reference line outside the frame, but maintaining the same vertical alignment.

The subject must be comfortable but not too relaxed as the head needs to be held in a upright position. In non-smiling views the lips must be relaxed, either together or apart. It is preferable to have the patient breath through the nose and then to instruct them to relax their lips. The lips will remain either closed or open slightly whichever is more comfortable and natural.

Evoking a smile is often the most difficult task in the whole procedure. Simply asking a subject to smile is usually resoundingly unsuccessful! The resultant expression is often more a 'grimace' than a smile and most uncharacteristic for that person. Various catch phrases can be used to have the subject think of a situation which might produce a smile. Often a 'silly' suggestion is more effective than a humorous one. The word 'smile' is preferably avoided in the instructions.

The profile view must have the patient looking horizontally with head level and comfortable. Looking into a mirror is an effective way of directing the eyes horizontally however some patients find this distracting. It is generally easier to have the subject look at a spot on the opposite wall at about eye-level.

Focus is obtained as described above and the shutter is then released during a very slight 'forward press'.

MOUNTING AND PRESENTATION

It is important that the prints are mounted for case assessment and presentation. The four photographs can be mounted on A4 card and placed in a plastic sleeve for protection. In this form they store easily along with the cephalometric radiographs.

The size of prints has been standard at 90mm × 131mm for some years. Recently larger prints (100mm × 150mm) have become common. This size may be the standard for the future. The clinician should choose a processing laboratory which will continue to supply the size required.

SUMMARY

Facial photographs of consistently excellent quality are an essential component of orthodontic diagnosis and treatment evaluation. A reliable system, incorporating good equipment and a standardised technique, is described.

The following is a summary of the author's facial photographic system.

Camera Body: Minolta SRT 101b

Camera Lens: 100mm Minolta MD Tele Rokkor Standard Lens (1:2.5)

Camera Settings: Speed: 60 sec.
ASA: 100
Aperture: Halfway between f11 and f16
Distance: 1.4m

Main Flash Unit: Sunpak Auto 220 (Manual Setting)
Connected via Synchronisation Cord
Mounted on Handle Grip (Right Angle)
Powered by 4 × 'AA' batteries

Auxiliary Lighting:

(a) Front of Subject
‡ Morris/Popular AC Slave II
Mounted 2 metres from subject at 11 o'clock position

(b) Background
‡ Morris/Popular AC Slave II
Mounted on low ceiling beam, immediately behind subject. Directed on background (2 metres from background).

Background:
Mid-blue Holland Blind (1m × 2m)
Position: 2 metres behind subject

Film: Kodacolor** 'Gold'™ Print Film
ASA: 100

Part III (Photography for Lectures) will conclude the series and will be published in a future issue.

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