



Clinical Photography Manual

Introduction

Welcome to the Astra Tech guide to clinical photography. At some time in our lives we have all used a camera, but clinical dental photography doesn't lend itself well to the concept of "point and shoot." The nature of the environment, the small sizes and distances involved, and the difficulty of access make dental photography an art as well as a science. And like science, there are rules that have to be obeyed, such as focus, exposure and composition. But as with art, results improve with practice and experience.

As an adjunct to the practice of dentistry, clinical photography brings rewards such as a sense of satisfaction in a job well done, the ability to share one's work with colleagues and patients, and a great opportunity to advance your dental practice.

Good luck with your clinical photography!

Special thanks to Per Rehnberg D.D.S. – contributor and photographer

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The right equipment for the job



A digital SLR-camera used for extra- and intra-oral photographs.

Digital images

Digital cameras are improving continually. We recommend a digital camera system (one in which the lenses can be exchanged) with a macro lens and ring flash (or point flashes for macro photography). Digital images have a number of advantages, such as immediate access to any shot and the possibility to re-shoot if necessary. It is also easier to process digital images (for example to change color balance, rotate and crop any images). Today, more and more administrative clinical software can process and safely store images pertaining to patient data.

By its very nature, this brochure cannot be comprehensive, but good results are much easier to achieve with the right equipment. Here are our recommendations.

Optical viewfinder vs. LCD displays (digital cameras)

To guarantee consistent excellent quality, an SLR (single-lens reflex camera) should always be used. With this type of camera, one can see the image being composed through the optical viewfinder. Other types of viewfinders may not be so precise when focusing and with reproductions. A digital camera with an LCD display may seem like a tempting option, but this type of camera is difficult to use in a clinical environment when it comes to accuracy in positioning and focusing. Another important aspect is to choose a camera where you can set the aperture yourself, as the depth of field (the distance in front of and behind the point of maximum clarity that is in focus) is very limited at the ranges involved when executing macro photography. Depending on the power of the flash and the distance from the subject, you should always choose the minimum size aperture possible, such as F22 or F32 (the higher the F-stop number, the smaller the lens opening). This reduces the risk of distortions and blurred shots.

Flash

Always use a ring or point flash that is intended for close-up photography. Choose a flash/camera combination that permits TTL (Through The Lens) control of the flash, which will make perfect exposure easier to achieve. If you are using automatic focus, the autofocus may not work accurately at certain light thresholds, especially in low-light situations. Modern close-up flashes usually have auxiliary lights that simplify focusing. You can also use the dental operating lights if additional light is required.

Lens

It is a good idea to buy the best lenses available. Choose lenses that are specially designed for macro photography (close-ups). Macro lenses with a focal length between 55 and 110 mm are the best and most widely used with 35 mm cameras. Note that the digital system models available today have smaller image sensors than a camera designed for 35 mm film. A 60 mm lens on a 35 mm camera, for example, can often be compared to a 90 mm lens on a digital camera.

Under certain conditions, autofocus can simplify photography, but may cause problems when taking close-up shots. One option is to turn off the autofocus function and use the fixed focus set-up on the lens for a more uniform composition, such as 1:2 or 1:1, then move the camera toward or away from the subject to find the right focus and composition.

Transferring images

The ideal solution for maintaining orderly records is to transfer images from the memory card after each patient. These can be transferred using a card reader or directly from the camera via a cable (e.g. USB) into the clinic's image storage program that should preferably be connected to the clinic's administrative software. Wireless electronic transmission is another option.

Lip retractors

There are two types of lip retractors commonly in use: the type which has to be held in place by the subject or an assistant, and the type which has a spring incorporated to keep it in position. The latter often means that the lips rest against the buccal surface of the teeth, which is why this type might not be the optimal choice.

Mouth mirrors

The mouth mirrors that should be used in clinical photography are the "metal film plated glass mirrors." When purchasing mouth mirrors, buy the best you can afford to ensure good optical properties and freedom from distortion. Treat your mouth mirrors as precision optical instruments when handling them, avoid finger marks and ensure that your dental surgery assistant realizes that they need to be handled carefully to avoid scratching.

Remember that cold metal placed in a warm mouth will almost certainly cause the surface of the mirror to mist up. This can be remedied by warming the mirror before use. A steady stream of air from the syringe blown gently across the surface of the mirror can help, but only if it is gentle enough to avoid the production of excess saliva. Asking the subject to hold his/her breath just before taking the shot can also help avoid misting.



Most situations that arise in clinical photography can be handled with retractors (A). Retractors that are adjusted and cut down will add flexibility in photographing occlusal views (B).



Using mirrors 1 and 2 will cover most clinical situations.

Frontal view

Although the subject can be asked to hold their own lip retractor while photos are taken, an assistant who understands the needs of clinical photography can be a great asset in positioning the retractors optimally and in achieving the best results for publication or education.



Viewed from the front, the assistant should be asked to pull the retractors (i.e. retractor A) not only outwards, but also forwards towards the camera. This ensures that the buccal surfaces of the posterior teeth are not obstructed by the soft tissue of lips and cheeks.



Remember to use suction and syringe to dry the teeth and remove pooled saliva before each shot.

Lift the soft tissue upwards and outwards from the buccal surface of the teeth using a lip retractor. Focusing on the lateral incisor helps ensure an adequate depth of field that will have all teeth with an acceptable focus range.

Try to keep the occlusal plane horizontal, lined up with the top or bottom edge of the viewfinder. Remember that with digital images alignment errors can often be corrected afterwards.



Take one shot of the intercuspal position and complement this with a second shot with the patient in a resting position showing "free space."



Occlusal view

The occlusal view requires the use of a mouth mirror. Use lip retractors to lift the soft tissue away from buccal tooth surfaces and focus on one premolar.



The images below show preparations for photographing the upper and lower mandibles in which a mirror is positioned at the correct angle. Establishing a 45 degree angle between the mirror and the camera for occlusal shots is recommended although this may not always be achievable.



Upper mandible – occlusal image

Lower mandible – occlusal image

Positioning the mirror far enough back in the mouth to capture the upper second and third molars can elicit the gag response, so be prepared to use the same techniques you might use when taking radiographs or impressions. If this is a problem, the mirror can be positioned to highlight the region of interest and rest on the occlusal area of, for instance, the first molar.

When photographing the lower mandible, the patient should be encouraged to relax the tongue and if possible, to keep it behind the mirror, pressing upwards toward the palate.

For optimal results with the occlusal view, the lips should be retracted before positioning the mirror. Ordinary lip retractors will put too much strain on the oral tissue to allow correct insertion and positioning of the mirror. The best solution is either to use two mouth mirrors, held by an assistant, or to use two specially adapted lip retractors (i.e. retractor B), cut down and rounded for safety, as shown here in the upper and lower arch.



Retractor B positioned for an occlusal view of the upper mandible.



Retractor B positioned for an occlusal view of the lower mandible.

Lateral views



Lateral image taken using only a lip retractor. This often works well as a standard method as it is quick and easy. Other variations are possible, such as with a more anterior direction when keeping an esthetic record of the front (with or without a retractor).

Lateral images can be taken either with or without a mirror. When taking images without a mirror, it is better to use a lip retractor with a narrow (acute) angle between the upper and lower sections (i.e. lip retractor A). This puts less tension on the lip musculature and helps ensure that the lip can be drawn backwards as far towards the ear as possible. It will show buccal surface of the teeth clearly as far back as the second or third molars.

For the best esthetic result, watch for the lower lip escaping back over the cervical area of the lower incisors, marked with arrows in the first image on the left. By asking the patient to relax and at the same time releasing the pressure on the lip retractors slightly, it is usually possible to prevent this from happening.

When using a mirror for lateral photos (i.e. mirror no 2), ask the patient to try to relax once the mirror has been inserted. This creates space for the cheek to be lifted outwards and permits a better angle between mirror and camera.



Lateral images taken with a mirror may sometimes produce better views, but are more difficult for both the patient and the photographer. Note how the flash produces different lighting effects on the two cropped images above. The mirror image needs to be rotated horizontally (as in the image below it) in order to get an accurate view.

Remember that a lingual positioning of the mirror can trigger the gag reflex. Asking the subject to keep his/her tongue relaxed and in the middle of the mouth will create more space for the mirror in the sulcus than if the subject, trying to be helpful, moves his/her tongue from one side to the other and in doing so raises the floor of the mouth.

Pre- and post-operative comparisons

One of the most compelling reasons for taking intra-oral photographs is to provide a “before and after” comparison, or to demonstrate the stages in a surgical or restorative procedure. To make such comparisons effective and easy to follow, it is important that the viewer can move from one image to the next in the sequence without having to re-orientate themselves. This generally means that all images in the series should be taken from the same angle and with the same exterior limitations.

Look at the sequence of images below, in which perfect continuity is marred to some extent by the appearance of the lower incisors in the first photo of the sequence and their exclusion in the subsequent photos.



A useful technique for emphasizing the foreground in these anterior shots is to hold an opaque piece of matte (i.e. non-reflective) plastic or oxidized alumina behind the teeth, thereby removing the confusion of the background.

Images used to illustrate a procedure in progress have the specific problem that the act of taking photographs can interfere with or delay the procedure. However, as with almost all professional photography, it is up to the photographer to dictate both the composition and angle of the image required in order to achieve satisfactory results. Taking a little more time to stage manage each photograph and taking a number of shots of each stage if necessary is preferable to being rushed and ending up with images that are of no use for the purpose intended.

The two sets of images below show how the photographer has successfully used the same content and angle in consecutive shots.



Full face images



Make sure that extra-oral shots are taken before the intra-oral shots to avoid the risk of redness and marking from lip retractors.



To record the subject's resting position, ask them to say "Emma" or "Mississippi" just before taking the picture.



Smiling and laughing views can be very useful in showing how the lip line relates to the tips of the teeth and gingiva (smile line).



Full-face images should be taken against some type of background. A blue background is very popular, but the results can be that the facial skin tone takes on a yellowish hue. A grey or black background is more neutral.

Positioning the subject (the patient) against a background and taking a shot with a flash will give what is called a projected shadow. Projected shadows can be eliminated by using a darker background (as in the image below).



In the case above, a black matt blind was hung as a backdrop. The ring flash on a modern camera can be removed so that the camera can be held in one hand and the flash in the other. By angling the flash so that it casts its light diagonally from the front of the subject and by taking an image with a lower aperture (< 18), it is easy to achieve results such as these. The red eyes effect will be minimized as well.

Ask the patient, for the purpose of variation, to turn sideways or to turn his/her head in order to give the shot more depth.

If you would like your facial images to be of a more professional standard, better quality lighting is required, such as for slave flash photography. In such a case, you should seek the advice of a professional photographer to make more individual upgrades and adjustments.

Publishing your images

The following guidelines will be useful when submitting your photographs for publication.

Before submitting photographs, contact the publisher to check their exact requirements, the financial and copyright terms on which they accept images and, if appropriate, the arrangements for returning your material after publication. Obtaining a written statement from the publisher which clarifies these matters before you submit your work can save a lot of time and trouble should a dispute arise.

Requirements also differ in terms of the type and quality of material which publishers will accept.

Digital images

To ensure the highest possible quality of the original digital image, the camera must be set up for high resolution (which will reduce the number of images you can capture in memory).

Remember that an image that looks fine on your PC screen may not be of high enough quality for print reproduction. If you are manipulating original digital images on your computer (e.g. cropping, rotating, amending color balance), make sure that the image quality is maintained when you re-save the amended file and that you do not overwrite the original files. Certain types of files compress or otherwise degrade the data to save space, but in doing so sacrifice quality.

Before submitting, check with the publisher what types of files they will accept, what size files they will allow and what type of image compression they will be happy with. Also check whether they prefer to receive your files by email or CD/DVD.

Transparencies

The rapid evolution of digital photography reduces the importance of transparencies. When submit

ting transparencies, ensure that they are in glassless mounts and are well protected. Ensure that your name and address are marked clearly on the mount using a small sticky label, and “spot” the slide to show which way the image should be viewed (especially important with some dental subjects shot using a mirror). To “spot” a slide, hold it in front of you the right way round and right side up and apply a small round sticker or equivalent felt pen mark to the bottom left corner of the slide mount.

Prints

Improvements in print technology have meant that an increasing number of publishers accept prints for publication. Quality of reproduction is not as good as when starting with a transparency, but could be acceptable for some purposes.

Remember that not all film processing laboratories work to the same high standards, so have the film processed by a reputable laboratory. Photography magazines routinely run laboratory comparisons, and the difference can be staggering.

A note on copyright

The fact that you have treated and photographed a patient does not give you the right to use those photographs. Your patient may be grateful, impressed and very pleased with the work you have done for them, but you should respect his/her rights. To do so, make it a habit to get a “model release” signed by each subject, even if you do not think at the time that those particular images will be published or shown in public. There are many variations on the Model Release document, and an Internet search will reveal many, which you can adapt to your own requirements, language and local laws.

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Australia

Astra Tech Pty Ltd.
Suite 1, 53 Grandview St, Pymble NSW 2073
Tel: +61 2 9488 3500. Fax: +61 2 9440 0744
www.astratechdental.com.au

Austria

Astra Tech GesmbH
Schloßhofer Straße 4/4/19, AT-1210 Wien
Tel: +43-(0)1-2146150. Fax: +43-(0)1-2146167
www.astratechdental.at

Benelux

Astra Tech Benelux B.V.
Signalrood 55, NL-2718 SG Zoetermeer
Tel: +31 79 360 1955/+32 3 232 81 50
Fax: +31 79 362 3748/+32 3 213 30 66
www.astratechdental.nl

Canada

Astra Tech Inc.
2425 Matheson Blvd East, 8th Floor
Mississauga, ON L4W 5K4
Tel: +1 905 361 2844
www.astratechdental.com

Denmark

Astra Tech A/S
Husby Allé 19, DK-2630 Taastrup
Tel: +45 43 71 33 77. Fax: +45 43 71 78 65
www.astratechdental.dk

Finland

Astra Tech Oy
PL 96, FI-02231 Espoo
Tel: +358 9 8676 1626. Fax: +358 9 804 4128
www.astratechdental.fi

France

Astra Tech France
7, rue Eugène et Armand Peugeot, TSA 90002
FR-92563 Rueil Malmaison Cedex
Tel: +33 1 41 39 02 40. Fax: +33 1 41 39 02 44
www.astratech.fr

Germany

Astra Tech GmbH
An der kleinen Seite 8. DE-65604 Elz
Tel: +49 6431 9869 0. Fax: +49 6431 9869 500
www.astratechdental.de

Italy

Astra Tech S.p.A.
Via Cristoni, 86, IT-40033 Casalecchio di Reno (BO)
Tel: +39 051 29 87 511. Fax: +39 051 29 87 580
www.astratechdental.it

Japan

Astra Tech K.K.
1-7-16 Sendagaya, Shibuya-ku, Tokyo 151-0051
Tel: +81 3 5775 0515. Fax: +81 3 5775 0571
www.astratech.jp

Norway

Astra Tech AS
Postboks 160, NO-1471 Lørenskog
Tel: +47 67 92 05 50. Fax: +47 67 92 05 60
www.astratechdental.no

Poland

Astra Tech Sp. z o.o.
ul. Orężna 58, PL-02-937 Warszawa
Tel: +48 22 853 67 06. Fax: +48 22 853 67 10
www.astratechdental.com

Spain

Astra Tech S.A.
Calle Ciencias nº 73 derecha. Nave 9,
Polígono Industrial Pedrosa,
ES-08908 L'Hospitalet de Llobregat
Tel. Servicio al cliente: +34.902.101.558
Tel: +34.932.643.560. Fax: +34.933.363.231
www.astratechdental.es

Sweden

Astra Tech AB
P.O. Box 14, SE-431 21 Mölndal
Tel: +46 31 776 30 00. Fax: +46 31 776 30 17
www.astratechdental.se

Switzerland

Astra Tech SA
Avenue de Sévelin 18, P.O. Box 54
CH-1000 Lausanne 20
Tel: +41 21 620 02 30. Fax: +41 21 620 02 31
www.astratech.ch

United Kingdom

Astra Tech Ltd.
Brunel Way, Stonehouse, Glos GL10 3SX
Tel: +44 1453 791763. Fax: +44 1453 791001
www.astratechdental.co.uk

USA

Astra Tech Inc.
890 Winter Street, Waltham, MA 02451
Tel: +1-800-531-3481. Fax: +1-781-890-6808
www.astratechdental.com

Other Markets

Astra Tech AB, Export Department
P.O. Box 14, SE-431 21 Mölndal, Sweden
Tel: +46 31 776 30 00. Fax: +46 31 776 30 23
www.astratechdental.com

