THE USE OF CLOSE-UP PHOTOGRAPHY IN CLINICAL MEDICINE

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A descriptive writer, writes in "words" to describe the scene he sees for the purpose of conveying his impression of the scene to his readers. His readers have to imagine, sometimes even to shut their eyes to have a mental picture of such a scene. It is not an easy achievement. When a photographer sees a scene he likes, he takes a photograph of it. Others seeing such a photograph easily conceive the scene with all the details especially if the photograph is well taken with a good camera. Hence the superior claim of a photograph to a description in words of the same scene. Similary a good photograph of any ailment is superior to a description in words of the same ailment, and if when science has advanced well enough to preserve coloured photography from fading, photography in colours will be much more descriptive and helpful in the advancement of medical and surgical sciences.

However even at the present stage of photographic science, much can achieved for medical research workers by the scientific use of the camera, especially by taking close-up photographs of ailments. In this article we will consider the several techniques to be used for this purpose.

USES OF CLOSE-UP PHOTOGRAPHY IN MEDICINE.

It is well known that the most important requirement of medical photography is that the picture should be critically sharp and should not only reveal good surface texture but proper tonal gradation. These requirements are even more important in close-up photography, and when colour film is used, the correct hue is essential if the photography is to be of documentary value.

Well-taken photographs of a visible pathological lesion are accurate records which can be used for the following purposes: —

(1) Documentation.
(2) Teaching.
(3) Progress and treatment of disease.
(4) Medico-legal records.

(a) *Documentation.* "A Simple picture is worth a thousand words" and we can go further by saying that no amount of discription of a lesion is comparable to a simple well-taken photograph. Much as some clinicians will stress the need to be able to describe in words a visible lesion accurately, all must agree that there are limitations to the interpretation of a lesion expressed with "a mass of words".

Thus rare diseases, interesting lesions and others are to-day being photographed as supplement to written case records as have appeared for articles in journals and for other purposes.

(b) *Teaching* With the vast syllables, crammed clinical duties and constant new discoveries that a student in medical science has to keep up with to-day, there will repeatedly be important lesions and interesting operations which the student will have to miss. This is particularly true with subjects like opthalmogy or ear, nose and throat. In order to give such students as much knowledge as possible in the teaching curriculum close-up photography should be used to contribute to the usual clinical teaching not only of under-graduates but also of the post-graduates.

Recently, in the United States and other parts of the world. lesions of the eye, including retinal lesion seen through the opthalmoscopes, are projected onto "television" screen for teaching purposes.

(c) *Progress and Treatment of Disease.* Recording the progress of diseases which naturally will influence the treatment thereof, photographs are particularly useful aids especially in dermatology and radiotherapy. In some radiotherapy centres the area of treatment of each patient is carefully outlined and recorded by photographs. Dr. W. Schultze, Professor of Medicine in the University of Giessen wrote "it is useless to state that ... radiation therapy of the right foot was repeated under the following conditions....." He stressed that it is only by careful recording to the exact area treated that one can evaluate results and protect healthy tissue from radiation damage.

Perhaps more dramatic are the results of properly recorded plastic surgery, not only to illustrate functional improvement, but cosmetic appearance. For example, a child born with cleft-lip with its accompanying speech defects and unpleasant appearance, can be shown in photography to have been reconstructed to normal, except for the almost invisible scar.

(d) *Medico-legal record.* When bad injury had been inflicted or even when killing had taken place it was nearly invariable that pathologist recorded the lesions with a series of photographs which were used in courts of law as exhibits. There again in Medico-legal matters, a photograph makes itself useful.

THE USE OF COLOUR PHOTOGRAPHY

The great advances made in colour photography have encouraged doctors to abandon the use of black and white prints and slides, but while colour photography illustrates better in most instances, one should not forget that it costs much more and there is no guarantee that the colour will not fade. It is therefore advisible to use colour photographs only when essential. There is no better comment on "Coloured Illustrations" than that written by D. G. Cogan, Editor-in-Chief, Archieves of Opthalmology, which reads as follows:

"In practice, however, it is often most difficult to decide whether or not colour is indicated. Some conditions which warrant illustrations can be brought out only in colour. These present no problem. There are others which can be shown in black and white just as well in colour. These also present no problem. But then there are those. constituting the majority, where colour embellishes something which could be shown, although perhaps well, in shades of gray. Is the esthetic aspect sufficient justification for the additional cost and space of colour reproduction?"

A GOOD CLOSE-UP MEDICAL PHOTOGRAPH

While it is true that a good portraiture photographer may not be a good medical photographer, it is just as true that a mediocre portraiture may be a good medical photographer. His standard is judged by his ability to produce an accurate record of the condition and not an artistic distortion of what he thinks the photograph should be like. In short, he must be a good technician and not an artist: the latter must find room for expression elsewhere.

A good close-up medical photograph should be:—

1. *SHARP* The whole purpose of a close-up of a lesion is to bring up its details. A photograph which does not bring up such details has lost most of its value for clinical medical use.

2. *CLEAR* Distracting objects such as dressings over wounds, ear-rings or ointment over or around the lesion, must be removed.

3. *CONTRAST* The contrast must be clear. If too low the picture will lose its emphasis and if too contrasty, details will not be shown.

4. *BACKGROUND* The background should be plain to avoid distraction.

5. *SCALE* This is important especially when an accurate information of its size is to be of clinical significance.

6. *REPEATED PHOTOGRAPHS* These should have the same view, position and lighting and unless standardized will not be convincing nor be of satifactory comparision.

A few simple techniques to achieve good close-up medical photographs will be described briefly, to assist doctors, especially General Practitioners to utilise whatever type of camera he owns for his personal picture-taking.

CAMERA AND LENS

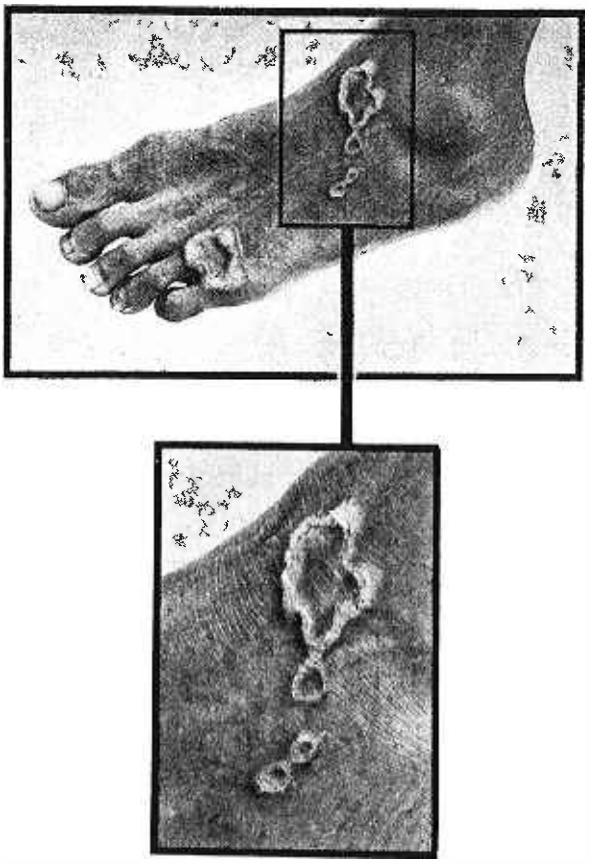
The trend of our present day inventors and scientists is to create things with speed and automation, and in the photographic field such advancements as the complicated structure of fast lenses, the exacting mechanism of a camera and the ever increasing emulsion speed of film, particularly colour, have all been constantly made. The structure of fast lenses which have more elements than the ordinary lenses, are designed primarily for available light photography and are best for candid shots or photo-journalism. An ordinary f/3.5 lens is adequate to cover all aspects of medical photography.

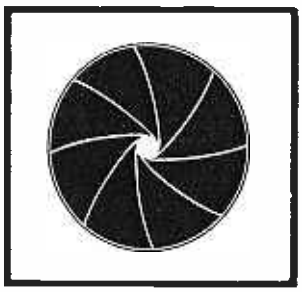
Cameras designed for ordinary use are usually not adequate for close-up photography: their maximum focusing distance of "lens-subject" is about 3 - 4 feet, which is suitable only for head and shoulder or full length infant cases. To overcome this limited range of focusing, a choice of systems can be applied to modify the existing camera so that one can focus at shorter distances than the normal limited range. There are several ways by which this can be achieved:

(a) *Clip-on view-finder.* Only a few camera manufacturers design special lenses for close-up without the need for additional supplementary lenses or extension tubes, for example the dual range Lietz 50mm f/2. Summicron lens for the Leica M2 or M3 models. The lens is supplied with a clip-on optical parrallax compensating viewfinder which functions with the camera range finder and close-up photographs can be brought down to 19 inches.

(b) *Cameras with fixed* lenses. To convert camera with fixed lens for close-up work, extra lenses must be placed in front of the normal camera lens to enable it to focus on the subject closer than the limited range. Because the lens is fixed there is no other way of increasing the lens-to-film distance to shorten the focal length

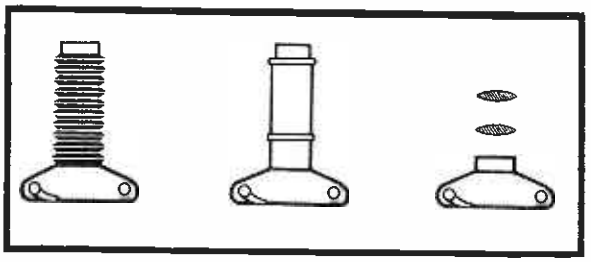
BASIC PRINCIPLES OF CLOSE-UP PHOTOGRAPHY





I

II



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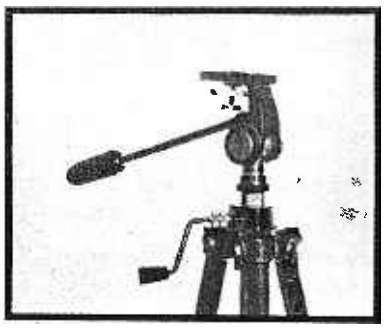


IV

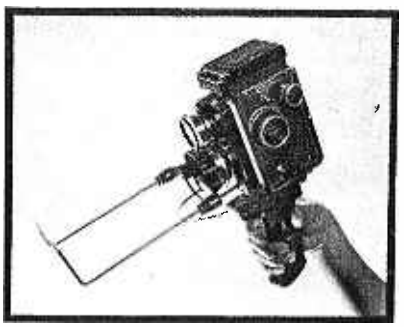
I. Small diaphragm for depth and sharpness

II. Electronic flash to arrest movement.

III. Different types of close-up gadgets:-
Bellows, extention tubes and supplementary lenses

IV. Tripod for steadiness.

VI. Focal frame finders are used to define area of focus.



V

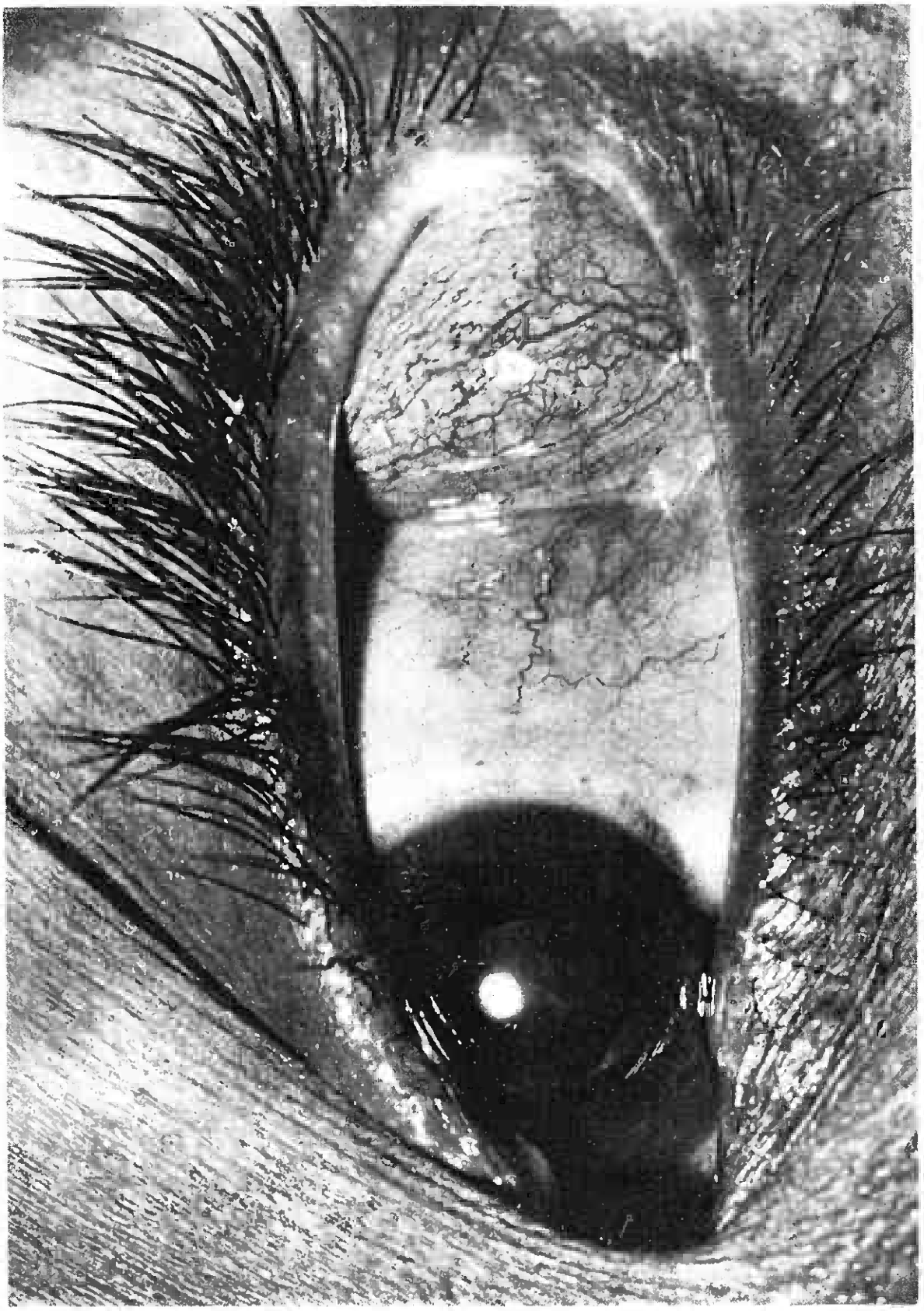


Figure 1. Conjuntival cyst of left eye.

Figure 2.

Figure 3.

Figure 4.

Figure 5.

Figures 2 and 4 show bilateral Carcinoma of both lids of four years duration. Figures 3 and 5 same patient after treatment with Radiotherapy.

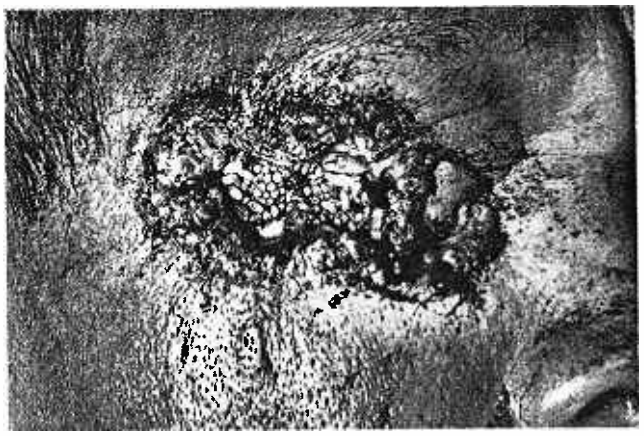
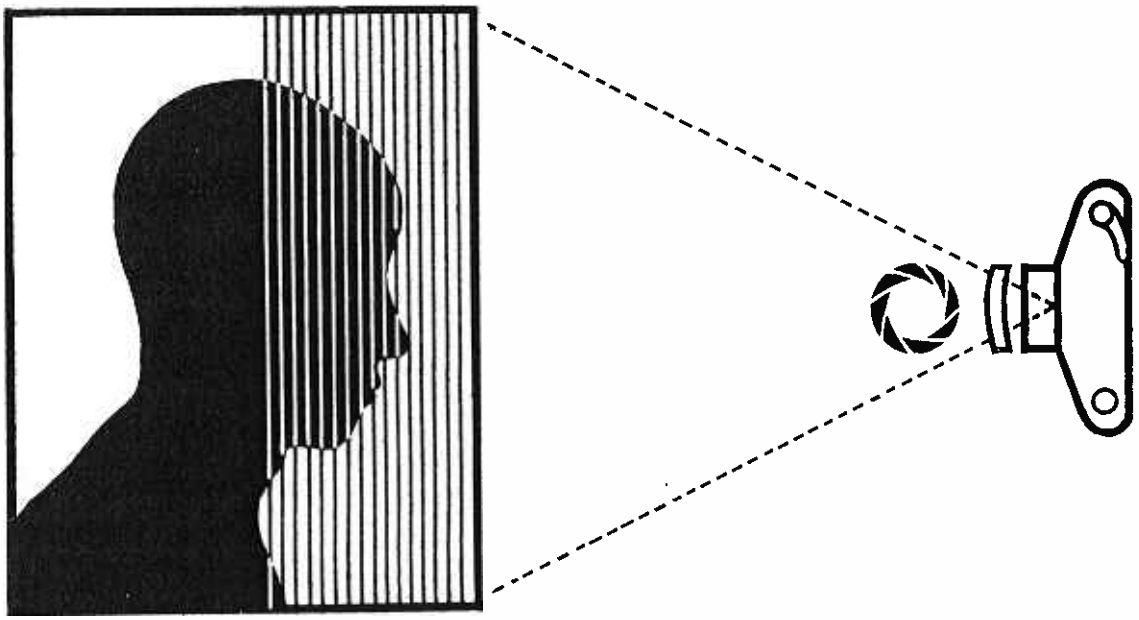


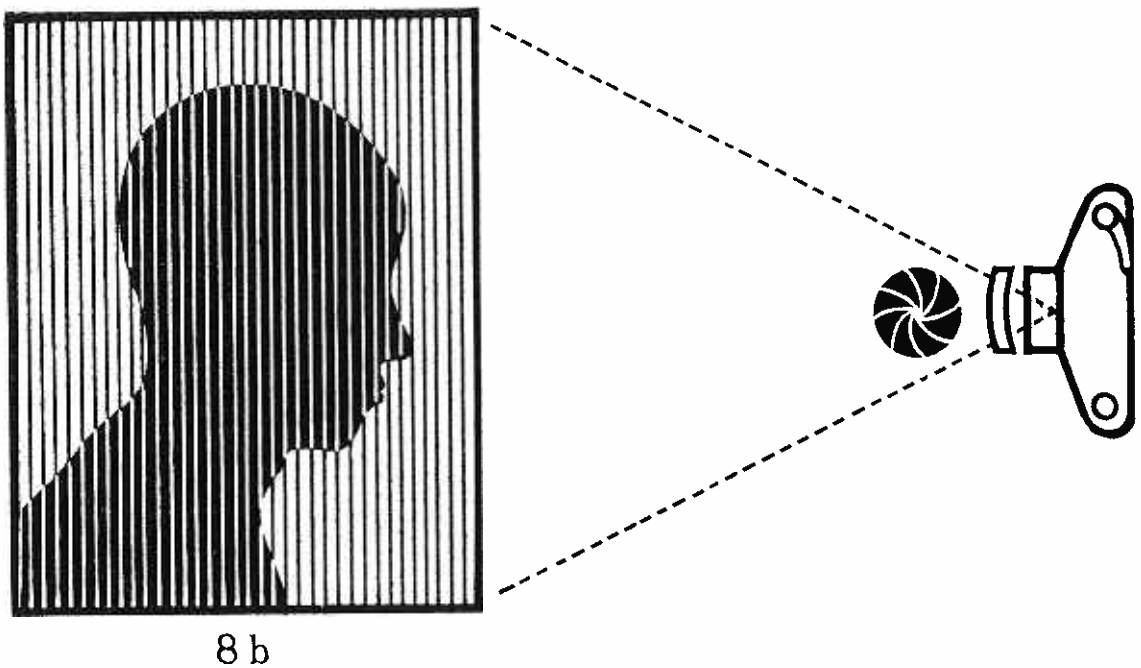
Figure 6.

Figure 7.

Figures 6 and 7 show Advanced Rodent Ulcer of right lid, with extensive destruction of right orbit and figure 7 shows ulcer after removal of maggots.



8 a



8 b

Figure 8 a shows a shallower depth of field with a bigger aperture, and 8 b a greater depth of field is obtained with a smaller aperture.

Figure 9. Photo shows the use of a "Bipod" for close-up work in the ward. This "Bipod" is specially made for bed ridden cases where the setting up of a tripod is a problem.

of the existing camera lens, thus we have to rely on the trickery of the supplementary lens placed in front of the camera lens. To suit one's choice, supplementary lenses are supplied with dioptre powers of 1+, 2+, and 3+. The bigger the figure of the supplementary lens the larger the magnification. They can be used singly or in combination. In the latter application, the more powerful one should be placed directly in front of the camera lens. Furthermore, to achieve sharp results, even with the best supplementary lenses, it is advisible to close the diaphram to the smallest aperture.

(c) *Single lens reflex cameras with interchangeable lenses.* The majority of these are made in the 35mm. group. Owners of the cameras are fortunate, for the various advantages are already built in. There is no fear of parallaxium even when the camera is advanced to a few inches from the subject.

In this system, the image is taken in through the taking lens which in turn reflexes the image by a mirror onto the viewfinder and can be focused until the instant of exposure. This is of prime importance where critical focusing and accurate framing of the object is essential to produce a good picture.

For close range work there are extension tubes or variable focusing bellows. Both of these attachments work on the same principle. but the focusing bellow is more convenient and versatile.

PROBLEMS OF EXPOSURE

A major problem in extending the lens-to-film distance is the differences in exposure. The measured exposure will no longer have its normal values. The lens-to-film distance will be extended back further, as a result, more exposure is required. We have either to widen the aperture or increase the exposure time. Increasing time exposure may cause vibration or movement of subject and widening of aperture will lose depth of focus. The best solution is to stop movement as well as closing down the diaphram to get sharpness, by using flash as a source of illumination. For this, there are several formulas to calculate the corrected exposure when the lens-to-film distance is extended.

FLASH

The application of electronic flash in medical photography particularly in close-ups overcomes many difficulties encountered. Because of its intense illumination of about 1/1000 to 1/5000 sec. it not only freezes a patient's movement in Paediatric and Opthalmic cases, but also allows a small aperture to be used, resulting in a sharp negative. The ease in transportation of a set of electronic flash to remote places where no other source of light is available is a definite advantage.

A special electronic flash such as a ring light is designed for extreme close-ups and intra-oral work. This is a circular flash tube secured by a mount attachment in front of the camera lens. Some models have a set of pilot light built on their side for focusing purposes. The source of illumination gives an even and shadowless effect, especially recommended for cases beyond the reach of any other source of illumination. For instance, in photographing a growth in the mouth or throat, the normal lens with the necessary attachments has to come up so near to the patient's mouth that it would obstruct any other form of light that illuminates from one side, with the result that half the area only will be lighted.

There are many procedures of lighting medical subjects. For simplicity and convenience, a single flash accompanied by an extra length of extension cable technique is generally adequate to cover the majority of close-up cases. Of course more lights can be employed, but these methods are more elaborate and complicating. Limitations in the movement of the flash lamp is often a problem with the short length of flash cable usually supplied with each set of electronic flash. This difficulty is easily overcome by the use of an extra length of flash cable so that the flash can be moved to the desired distance.

ARRANGEMENT OF LIGHT

For head and shoulder cases, the patient should sit as far away from the wall as possible. If a single light or flash is applied, it must be from a position above the camera and slightly above the sitter's head. It may be placed from the side or directly from the front so that the shadows cast behind the patient will not be shown. If two lights are to be used, one method is to direct one light as described above and the other from one side. The oblique light should be slightly nearer and lower. However, the second light can be placed directly behind the patient to kill away the shadows cast by the frontal light. In this case the patient can sit nearer to the wall, about 3ft away. Both these lighting procedures are most suitable for profile cases.

BACKGROUND

In black and white photography, a plain white background is essential. Remove pictures or calenders from the wall. Avoid a glazed or shining wall, as this will result in a glare of the light directed from the flash. This is to bring out the subject prominently without distracting details and a white cardboard sheet or a piece of white bedsheet can be used. A black background is sometimes advisible.

It is effective for cases when Infra-red film is used, and also for multiple exposures to illustrate successive images such as a patient's arm or leg movement. If colour is used, a coloured background will separate the subject from it giving a three dimensional effect. A blue background is best, as it separates the human skin tone from the contrasting background. Furthermore, the colour is pleasing, especially with fresh pathological specimen.

FIXATION OF OBJECT

Mainly because of the very short depth of focus in close-up photography and partly because of great amplitude of even the slightest movement it is important to fix not only the camera but also the object. Thus the camera should be placed on a tripod and the object fixed. In taking a picture of the eye, it is not enough to fix the head alone but also essential to fix the eyes by asking the patient to look at an object some distance away.

SUMMARY

1. The uses of close-up photography in medicine are discussed. They are for documentations, teaching, illustrating progress and treatment of disease and medico-legal records.
2. Colour photography and its inpact is briefly discussed and the criteria of a good medical photograph summarized.
3. An account of some technique in close-up medical photography is described, with special stress on the type of camera and lens required, and the most suitable lighting and background arrangement.

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