

Clinical Photography In Plastic Surgery A Review

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Abstract

Background: *Clinical photography is a particularly useful record in surgical practice especially in reconstructive and cosmetic surgery. A review of this topic is necessary in our environment especially considering the improvements that have taken place in photography over the years.*

Objectives: *To document the practice, uses and abuse of clinical photography especially in plastic surgery.*

Methods: *A search through the literature was conducted to assess the meaning, the importance, the limitations and abuses of clinical photography. Internet search was also done using different search engines including pubmed, google, msn, yahoo etc. Relevant literatures are compiled and reviewed.*

Results: *Forty one of a total of 388 scientific papers reviewed were relevant to the discussion. Accurate photographic documentation has been observed to be essential in reconstructive and cosmetic plastic surgery both for clinical and scientific purposes. Surgeons extensively rely on photographic communication for documenting surgical results, teaching, research, and obtaining informed consent from patients. However guidelines exist for taking clinical photographs. Clinical photographs can be abused especially with new technology and computer manipulation. This should be avoided.*

Conclusion: *Clinical photographs have become instruments in carrying out routine surgical work. Improvement in terms of effectiveness, cost reduction and timeliness of clinical pictures has evolved. Every surgeon should familiarise himself with the changing technology to make the best use of this important tool in medical practice.*

Key Words: *Clinical, photography, plastic, surgery, uses, abuses*

Introduction

Medical photography is an important part of documentary procedures in plastic surgery both for quality assurance and for protecting surgeons from possible medico-legal claims filed by patients. Photographic documentary standards were established to make photographs reliable and to enable comparisons between pre- and post-operative views of a patient, different operative procedures and between results achieved by different surgeons¹.

That a picture is worth a thousand words is not just another cliché. A lot has been done to bring development into photography-from transparencies to film production with elaborate space and equipment further to the development and making of pictures and further to polaroid production of pictures; and now to digital production with possible computer manipulation of photographs. All this translated to a lot done to bring development into photography including clinical photography.

Uniform patient photographs that create permanent

records are essential for any visually oriented medical specialty. Surgeons extensively rely on photographic communication for documenting surgical results, teaching and research, and obtaining informed consent from patients.

Photographic images supplementing written records have been used in clinical medical practice for many years². Before and after photographs in plastic surgery are essential parts of the patient's record. They also provide visual data to supplement both primary and continuing education lectures. Standard photographic technique in plastic surgery is an important topic that has been stressed in the discipline over the past several years. The plastic surgeon must adequately arm himself with the developments which have taken place in the last two or more decades in photography. Cosmetic surgery and photography are inseparable as clinical photographs serve as diagnostic aids, medical records, legal protection, and marketing tools³.

Accurate photographic documentation has become essential in reconstructive and cosmetic plastic surgery both for clinical and scientific purposes. Digital imaging systems are currently popular, being reasonably affordable and much improved in quality.

The additional information which a photograph provides is useful to record pathological findings, anatomic changes, surgical relationships, and outcomes⁴. The advent of digital photography has greatly increased the use of medical illustration within specialties dealing with visible pathologies. It offers improved communication between medical professionals helps in the education and counseling of their patients and forms an important aspect of their medical records. A facial plastic surgeon's photographic files are a potential storehouse of learning material. Manual review of before-and-

after photographs is time consuming and self-limiting. Computers can facilitate the analysis, storage, and review of photographs and thereby serve as an aid to learning from the results of surgery⁵.

Every surgeon, especially the plastic surgeon, must therefore be prepared to move on with the current development or be left behind to his own perils and regrets.

Historical Background And Development

Photography is a method for producing lasting images by means of a chemical reaction which occurs when light hits a specially prepared surface. It was invented during the first three decades of the 19th century as a direct consequence of advances in chemistry and optics.

The first successful picture was produced in June/July 1827 by Niepce⁵ using a material that hardened on exposure to light. This picture required an exposure of eight hours. However, not all people welcomed this exciting invention. Some pundits viewed it in quite sinister terms, according to a newspaper report in the Leipzig City.

The ideas of such people ran thus: "the wish to capture evanescent reflections is not only impossible... but the mere desire alone, the will to do so, is blasphemy. God created man in His own image, and no man-made machine may fix the image of God. Is it possible that God should have abandoned His eternal principles, and allowed a Frenchman... to give to the world an invention of the Devil?"

We owe the name "Photography" to Sir John Herschel, who first used the term in 1839, the year the photographic process became public. The word is derived from the Greek words for "light and writing".

In the 16th century many artists employed a box-like device known as a camera obscura (Latin meaning

“dark room”) as an aid to depicting space with single-point perspective. This consisted of a box with a pinhole on one side and a glass screen on the other. More than 2000 years before the invention of the camera obscura, the ancient Phoenicians knew that a certain snail, the purpura, left a yellow slime in its wake that turned purple in sunlight.⁶

Clinical Photography

Clinical photography is used in all aspects of surgery. Books, whether medical or surgical throughout history have used pictures to teach trainees and specialists in the acts of diagnosis and treatment of patients. Pictures are a very important part of Dermatology practice and surgical specialties including Ophthalmology, Ear Nose and Throat surgery as well as many pathological specialties.

Uniform patient photographs that create permanent records are essential for any visually oriented medical specialty⁷. The role of clinical photography in aesthetic plastic surgery requires it to set high standards for the quality of the photographs taken⁸. Surgeons extensively rely on photographic communication for documenting surgical results, teaching and research, and obtaining informed consent from patients⁹. Plastic surgeons have associated themselves closely with photography almost since the inception of medical photography¹⁰. The taking of clinical photographs, to record and to utilize during surgery, is an essential aspect of the activities in every professional office or department of facial surgery¹¹.

The plastic surgeon who wishes to share clinical experience with colleagues is obligated to produce accurate data in the form of photographs. Moreover, accurate photographs are essential to enable an objective critical appraisal of one's own surgical skill and to display postoperative results to patients in an

unbiased fashion¹². Subjective interpretation of preoperative and postoperative photographs is heavily relied on for evaluating standards of care. With the increased availability of digital cameras, there is an increased tendency for clinicians to take digital photographs of patient's themselves¹³. Indeed accurate photographic documentation has become essential in reconstructive and cosmetic plastic surgery both for clinical and scientific purposes⁴. The technological evolution has changed multiple areas of plastic surgery with developments in photography to match.

Some authors have noted that photographs as instruments used by plastic surgeons can only be promoted but not eliminated by technological changes¹⁴.

Uses

A communication illustrated with images is superior to one without, in persuading an audience. Thus, in cosmetic surgery, images are widely used to inform and to lure consumers¹⁵.

Photography gained the interest of many scientists and artists from its inception. Scientists have used photography to record and study movements, such as Eadweard Muybridge's study of human and animal locomotion in 1887¹⁶. Not many other professions enjoy the use of photography like the medical profession. It serves many purposes from the education of the patients on the possible and achievable postoperative appearance following the different surgical procedures, to the complications possible following surgery. Photography has been of great assistance in teaching. Many pathological problems, some of which the students may never come across in their practice are shown in books.

It is mandatory to have preoperative photographs of all rhino-plasty patients. Photographs in rhino-plasty

surgery have the same importance as audiograms in ear surgery. They constitute an accurate reminder of preoperative state of the patient. It is amazing but true that patients tend to forget their preoperative appearance soon after surgery and hence accurate photographs are important medico-legal documents. They can prevent unrealistic expectations.

A trained professional photographer is an ideal person for pre and post operative photographs but constant availability of such a person may be a problem. Physicians interested in cosmetic surgery must have a working knowledge of photography and necessary equipment. Positioning the patient is critically important for standardizing the preoperative evaluation. Luel and Larsen have suggested that, photographs in plastic as well as maxillofacial surgery should be taken in the standard views: viz frontal, right and left lateral (profile), oblique and worm eye view (basal)¹⁷.

It has been observed that in a specialty with a dramatically increasing trend toward communication by means of digital imaging, an effort toward standardization is essential. Clinical photos contribute to the emotional and bodily part of gaining knowledge and thereby complement the verbal information, which is primarily cognitive. The combination of listening to verbal information and looking at pictures makes sense to the patient¹⁸. Digital photography allows instant picture viewing and printing as well as web-based mailing and, as a result, it facilitates communication between the dermatologists, surgeons, and pathologists during the surgical treatment for example in cutaneous neoplasms¹⁹.

Consistent, uniform, high-quality photography allows the best opportunity for critical self-assessment and self-education²⁰. The advantages of a digital imaging system include quality images, easy

storage and retrieval, and cost-effectiveness. The disadvantages are few: a substantial initial investment and the training of office personnel in its use and maintenance. Of course digital photographs are open to fraudulent manipulations. Uses include monitoring naevo-melanocytic lesions, surgical photo documentation, medical records, and photographic research databases²¹.

Photography is also very helpful to patients. Surgeons generally tend to show the preoperative and postoperative pictures of similar lesions or pathologies to patients when they present. These, many times encourage the patients to go on with the surgery and assures them of possible outcome. It has indeed been observed that patients find it positive to look at clinical photos, because it gives them knowledge and understanding, as well as realistic expectations and a sense of security in having made the right decision. The photographs help confirm or validate their expectations. Indeed, patients experience photographs as a positive element in their treatment and appreciate or acknowledge that photographs give them an answer as to how they will appear after surgery, which is difficult to describe in words¹⁸. This has also been shown irrespective of the age, sex, or diagnosis of the patients.

Photo-documentation of the face before aesthetic or plastic surgery is of fundamental importance for at least three reasons: it is an aid to surgical planning, it can be used for illustrative purposes in discussions with the patient, and it satisfies medico-legal requirements for documentation²². Many aesthetic centers document the preoperative as well as postoperative pictures of the patient in the case notes. Such photographs are attached to either the second or last but one page of the case notes and can be referred to ad infinitum. Some document these pictures in electronic devices like the computer, CDs or any other computer storing medium. This enables both

the surgeon and the patient to always refer to the starting point of the treatment as well as the improvement achieved so far. It should be noted that when photographic records of the patients are documented in addition to patients' data, the potential for mistaken patient identity is reduced.

Clinical photography has also been found useful in research studies comparing different body structures especially on the face²³⁻⁷.

Techniques Of Photography

For preoperative and postoperative digital images to accurately reflect surgical outcomes, image characteristics other than acquisition, must be rigidly standardized. Surgeons generally and plastic surgeons specifically must arm themselves with the technique of good photography. Guidelines exist for taking clinical photographs⁴.

It has been observed that much variability exists for all image characteristics between preoperative and postoperative images. Many are crucial to the evaluation of the surgical outcome depicted. In a specialty with a dramatically increasing trend toward communication by means of digital imaging, an effort toward standardization is essential²⁸. It is believed that through standardization of photography, the surgeon will achieve consistency, demonstrate relevant anatomic detail, allow preoperative planning as well as reproduce accurate preoperative and postoperative comparisons²⁹. Positioning of the patient while taking a preoperative or post operative picture is equally very important. Small changes in patient positioning during photo-documentation for facial plastic surgical procedures can cause dramatic changes in the appearance of certain parameters. Standardizing patient positioning for preoperative and postoperative

photographs is imperative³⁰.

The variables that can have a big impact on photographs are: the room in which the photographs are taken, the camera used, the type of film used, the distance of the photographer from the patient, the photographer himself or herself, the light source and location, the film development process, and when the postoperative photographs are taken³¹. In general, all the elements for preoperative and post operative pictures must be the same i.e. .SAME distance, same height, same background, same lighting, same Zoom, as well as Camera position always parallel to the floor in a straight line (no tilt). In General, it has been agreed that there are eight positions for patient's photographs.

- i. Anterior view - The patient is facing the camera.
- ii. Right anterior oblique view - A 45 degree angle to the right
- iii. Right Lateral view - A profile picture from the right
- iv. Right posterior oblique view - The patient's right backsides should face the camera at a 45-degree angle.
- v. Posterior View - The patient's back should face the camera.
- vi. Left posterior oblique view - The patient's left backsides should face the camera at a 45-degree angle.
- vii. Left lateral view - A profile picture from the left
- viii. Left anterior oblique view - A 45 degree angle to the left.

A light to medium solid colour background is expected with other items removed from the scene so that it is just the patient and the solid background.

One should avoid harsh shadows by stepping forward from the background or lighting the background separately. One should also be sure that there is plenty of light while avoiding strong overhead lights or lighting only from one side, which contribute to shadows. Camera should be positioned at the same height as the area being photographed so that the camera does not distort the image by being tilted up or down. The use of flash in photography ensures uniform light around the object especially when this comes from the frontal part of the objects being photographed.

A good posture must be maintained with the patient standing up straight. A clear, sharp focus will produce the best results and one should try to fill as much of the picture with the designated area while still maintaining sharp focus (this is usually no closer than 4 feet, depending on the camera). The entire face should be included in the picture and not cut off at the edge.

For head and neck pictures, the patient is expected to remove eyeglasses, make up and jewelries. He is also expected to pull his/her hair back off the face and neck and should not wear a shirt with a high collar. The photographer is also expected to leave some extra space at the edges of the photo, especially the sides.

Digital photography is different from the old system of photography in many ways. Indeed, digital photography has transformed photography to an easy and easily repeatable process with no harm. Digital photography uses an array of electronic photo detectors to capture the image focused by the lens, as opposed to an exposure on photographic films. The captured image is then stored as a computer file ready for digital processing, viewing, digital publishing or printing. Before the advent of digital photography, photographs were made by

exposing light sensitive photographic film, and using chemical photographic processing to develop and stabilize the image. This involved a very elaborate set up. Digital photography has eliminated the need for elaborate set up and therefore reducing cost.

Digital photography has become an economical and efficient substitute for conventional photography. Pictures taken long time before can be converted to a digital format to optimize results and to save the costs of clinical photography³³. Digital imaging systems currently are popular, being reasonably affordable and much improved in quality. They offer multiple advantages in terms of quality, easy image storage, viewing, retrieval and being comparatively inexpensive to take. Nevertheless, obtaining standardized, consistent, and relevant digital images is not easy outside a photographic studio⁴.

Clinical photographs should always be taken with the same camera lens, lens setting, lighting, film, and patient position to ensure reproducibility and to enable valid pre- and postoperative comparison³⁴. Although the cosmetic literature is replete with articles on standardized photography, these articles have eluded many practitioners due in part to the complexity of clinical photography. A paradigm shift has occurred in the past decade, and digital technology has revolutionized clinical photography and presentations. Digital technology has made it easier than ever to take high-quality, standardized images and to use them in a multitude of ways to enhance the practice of cosmetic surgery³.

Advances in digital photography have made it an efficient and economically appealing alternative to conventional photography. Nevertheless, as objective observers and clinical photographers, we must realize that all digital cameras are not created equal. Just as in film photography, inherent differences in features among digital cameras

produce dramatically different photographic results with regard to color, contrast, focus, and overall quality. To standardize digital photography, the surgeon must realize that switching digital cameras is akin to switching film types³⁵.

Given the current excellent image quality and ongoing refinements in digital photography, a digital photography unit may be cost-effective for a busy facial plastic surgery practice³⁶ as well as other medical specialties.

The use of mobile phones and internet services has improved the use of clinical photography tremendously in surgical and medical care. Today, pictures of clinical photographs can be taken by a resident doctor and sent to his boss to explain what he is describing unlike in the previous years when only verbal description could be done by the resident to his consultant on phone. The resident can store this image and discuss with his boss the following day or send the picture to him immediately with the help of the internet. Suggestions as to possible methods to use in closing a wound can then be made effectively by the senior doctor to his junior colleagues because he can see and have a better assessment of the pathology. The mobile phones, with large memory cards are also used as both storage facility for clinical photograph and as a source of transferring the pictures into the internet for storage or to share with others.

Photographs are sent daily by doctors to describe difficult cases and receive suggestions from colleagues through the internet. Indeed, the yahoo groups, face book, twitter have all become ready fora through which clinical photographs are exchanged for discussion today.

Consent

Until the early 1980s, the situation was that consent

to photography, while seen as desirable by medical photographers, was only rarely obtained in practice for subsequent publication. 'Patients have a fundamental legal and ethical right to determine what happens to their bodies'¹². This is equally true whether the patient is being asked to consent to major surgery or to procedures such as photography or video recording; which may seem to be relatively trivial when compared to major surgery. Unconsented use of such records may result in loss of privacy and dignity, and may cause major distress. In order to obtain 'informed' consent, the patient must understand all the issues with regard to the consent, and it must not be obtained under any form of duress³⁷.

It was earlier thought that every medical photograph is a part of hospital records, and that the copyright of the images is vested in the employing authorities³⁸.

However a turning point came in 1984 with a ruling from the Health Service Commissioner, United Kingdom, which resulted from a case concerning a man who had received extensive treatment at a teaching hospital for lymphatic disease⁹. After the death of the professor who had been treating him, he learned to his embarrassment and distress that two full-length frontal photographs of himself, unclothed and unmasked, had been published in a medical textbook. The textbook also contained the patient's initials and hospital number. The Commissioner ruled that the patient had a right to consent (or otherwise) to the use of such images, and that the hospital in question should have had an appropriate procedure for obtaining informed consent before confidential clinical information was used for purposes other than the patient's treatment.

It is currently seen as a good practice that patients consent should always be sought before clinical photographs are taken and further consent of the

patient may also be needed when considering the use of such pictures for publications or books that may reveal the patient's identity.

Although mobile telephone sets have entered into the practice of medicine and pictures are taken with them and sent to colleagues or senior doctors to describe a patient's lesion especially in emergencies, patient's pictures should not be shown on hand set or internet without the consent of the patients.

In a teaching hospital or a specialist centre where patient's picture are more likely to be used for publication, patient's written consent may be obtained and several uses to which the picture may be put should be explained to the patient. The patient can then approve or object to any use which may not be acceptable to him. This will prevent unnecessary legal issue with clinical photographs.

As much as possible, patients' identity must always be hidden when photographs that may reveal the identity of the patients are to be used for publication even when the patient has consented. This constitutes a good clinical practice.

Abuse Of Clinical Photography

It is very easy to commit but difficult to detect fraudulent digital photo manipulations. Surgeons and editors of journals need to be aware of the potential for misrepresentation of information through digital image manipulation and exercise caution in the communication of digital photographic information⁹. Furthermore, a number of inadvertent and simple image manipulations can also amount to misrepresentation.

The possible exploitation of computer imaging by novice surgeons as a marketing tool, coupled with the lack of consensus regarding the treatment of computer images, adds to the concern of surgeons³⁹. Editors may also be confused with manipulation of

digital pictures to portray what was not really done by unscrupulous physicians. There may be scope for cooperation within editorial circles to set standards for the submission of digital photographs.

Guidelines for the practice of an ideal clinical photography have been suggested⁴⁰ and include:

1. Informed consent for each use of the image must always be obtained from the patient or guardian
2. Specific and fully informed consent for photography should always be sought and granted before clicking.
3. This consent may be withdrawn at any time
4. Photography by a trained medical photographer in suitable environment is best. Patients' right should always be respected.
6. All images must be stored in a safe and regulated environment, with controlled access
7. Complete anonymity is impossible and minimum possible area of the body should be photographed.

Mere boxes, dots or shades over eyes do not make a complete anonymity when this is absolutely essential.

Conclusion

Photography has come to form one of the armamentarium of clinicians especially plastic and facial surgeons. It offers improved communication between medical professionals and it is very valuable in education and counseling of patients. It also forms an important aspect of medical records¹³. Improvement in terms of effectiveness, cost reduction and timeliness of clinical pictures has evolved. The digital revolution has also opened new

ways of storing, retrieving and distributing images¹⁷. It has been suggested that clinical photography should be a part of the skills that a plastic surgeon and indeed physicians who deal with physical pathology should acquire while in training⁴¹. Refresher courses and training workshops should also be given to older professionals to be up to date in photography. A basic aim of photographic documentation of clinical cases is to compare some cases with others. Every surgeon should become conversant with the art and habit of clinical photography as well as with the use and abuse to which it can be put. This will surely improve clinical practice and avoid overdependence on photographers who are not primarily involved in the care of the patients.

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