Photographic Principles of Medical Documentation

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Murillo Fraga, Diego Ricardo Colferai, and Marcelo Sampaio

9.1 Introduction

The standardization in photography in plastic surgery is a very important issue and has been exhaustively discussed in the last years. The documentation of images in scientific research must be done in a systemic and standardized way in order to allow its reproducibility [1]. This enables the validation and comparison of techniques as well as the analysis of results maintaining the scientific accuracy. The clinical photograph must always be taken by the same camera, film, lenses, distances, luminosity, and the same position of the patient [2, 3]. The use of a leveled tripod, electronic flash, spotlights, and markers and the standardization of the distance between the feet and the photographic background are very important technical elements [4]. The photographic background must be of gray color or surgical blue (royal blue), nonreflective. The spotlights (two units) are positioned at 45°, and the leveled tripod allows the adequate framework, which allows the stabilization of the image. The photographic incidences (front, right and left oblique, and right and left side) must be standardized (Fig. 9.1).

It is relevant to highlight the importance of preserving the right of privacy of the patient; therefore, the consent form must be solicited before any photographic documentation [4–6].

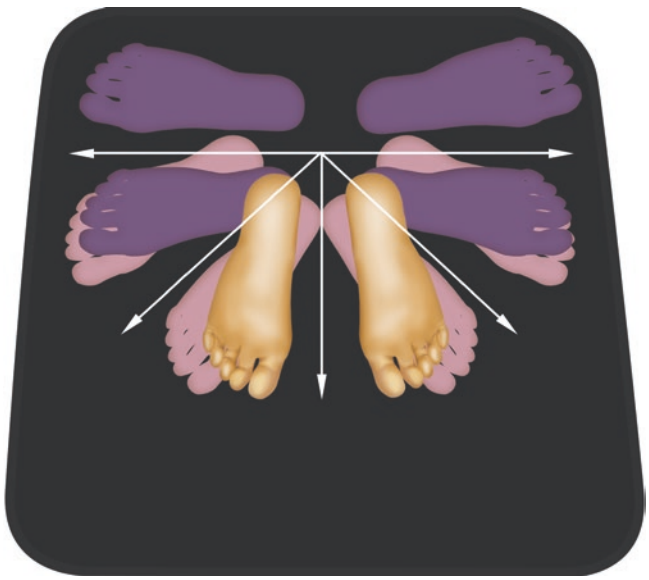

Fig. 9.1 Marking carpet for adequate maintenance of pre and post-surgery positions

9.2 Technical Aspects of the Photograph

9.2.1 Positioning

Aiming at standardizing the distance between the feet and the photographic background, a 1-cm-thick ethylene vinyl acetate (EVA) frame can be used, which keeps the positioning of the patient fixed at 70 cm from the photographic background and the distancing of 30 cm between the feet (Figs. 9.1 and 9.2) [2].

The photographic background made of polyester fabric measuring 1.60 m length by 1.40 m width in blue color is well stretched and fixed to the wall [7]. There is also a care protocol that was developed with the purpose of standardizing and ordering all stages of data collection, aiming at

M. Fraga (✉)
College of Medical Sciences at Santa Casa in São Paulo, Brazilian Society of Plastic Surgery, Breast Reconstruction Center at Sírio-Libanês Hospital, São Paulo, Brazil

D. R. Colferai
Brazilian Society of Plastic Surgery, Mastology Center at Sírio-Libanês Hospital, São Paulo, Brazil

M. Sampaio
College of Medicine at USP, Brazilian Society of Plastic Surgery, Breast Reconstruction Center at Sírio-Libanês Hospital, São Paulo, Brazil

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systematizing them [8]. A distance of 1.2–1.8 m for the body and the face is adequate. We suggest a 105 mm lens at a distance of 1.5 m for the face and a 50 mm lens or an equivalent for the documentation of the body (Fig. 9.2) [2].

The patient is guided to stay in anatomic position, keeping the eyes' horizontality (Frankfurt plan) during the measuring. The photo framework of the mammary region is defined by the crossline gnathion (chin region) on top and by the bottom edge of the navel at the bottom (Fig. 9.3) [1].

Even though the clinical photographs are taken of five different positions (anteroposterior (AP), right and left side, and right and left oblique [1, 9, 10]), a relaxed and a contracted position of the breast can be added. This maneuver is achieved by pushing the hands against the hip, and it allows a more dynamic assessment. In some particular cases, a leaning forward position is useful to demonstrate asymmetry. Several authors strive aiming at standardizing clinical photographs, but variability remains a challenge [1, 2, 10–12].

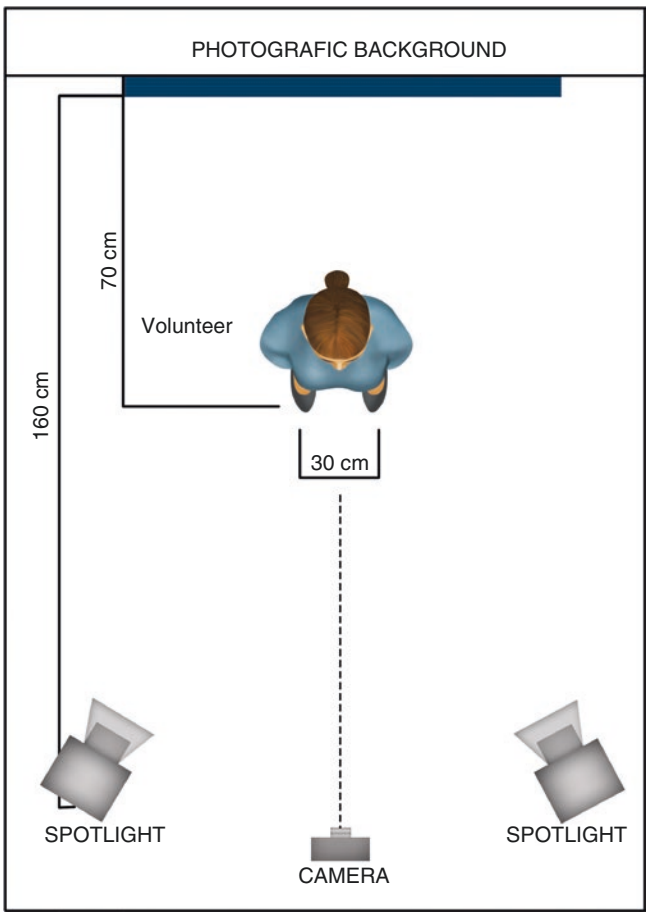

Fig. 9.2 Necessary equipment to assemble a studio in the doctor's office

9.2.2 Lighting

In plastic surgery many lighting ways have been suggested, from flashes of the camera itself to external lights in different configurations [8]. When it comes to a normal and informal picture, we observe a certain asymmetry in lighting; in other words, one of the sides of the body is illuminated differently. Now, when it comes to surgical documentation, there has to be symmetry between the hemibodies, as well as equal illumination of both sides. Thus, we suggest using a pair of umbrellas assembled at the height of the eyes with a 45-degree angulation.

A recurring problem in the lighting of images of the patient is that some details and contours are eliminated of flattened in such a way by the light that they are not visible. The cellulite in the body or certain facial wrinkles are frequently not seen in anterior light (flash) but are extremely apparent in vertical light. In general, skin irregularities are better observed in tangential light. Shapes such as breasts or contours of the body are better seen in slightly shaded light.

Lighting is a topic of extreme importance to preserve the technical accuracy of clinical photograph. Excessive lighting or overexposure can mask furrows, wrinkles, or scars. In the same way, poor lighting or underexposure may cause shades which accentuate folds or scars [4].

9.2.3 Storing of Images

Technology has evolved quickly. Some decades ago, drawings were used and, next, black and white photography, colored transparencies, and films. In the last 15–20 years, digital images have become the new pattern, and analogic photography became obsolete.

There has also been a change in the way images are stored. Diskettes, magnetic tapes, CDs, DVDs, USB drives, external HDs, and network units gave way to data archiving in the cloud [13]. The advance of technology presents challenges concerning technical work (software incompatibility, hardware, execution problems, scanning, and storing) and security. The lack of a specific legislation and clear rules makes the circulation of images through the Internet a weak point.

9.3 New Technologies for Breast Measuring

The three-dimensional surface image has gained popularity in plastic and reconstructive surgery worldwide because the two-dimensional pattern lacked in shape and depth [14]. The 3D image is a significant advance in photographic

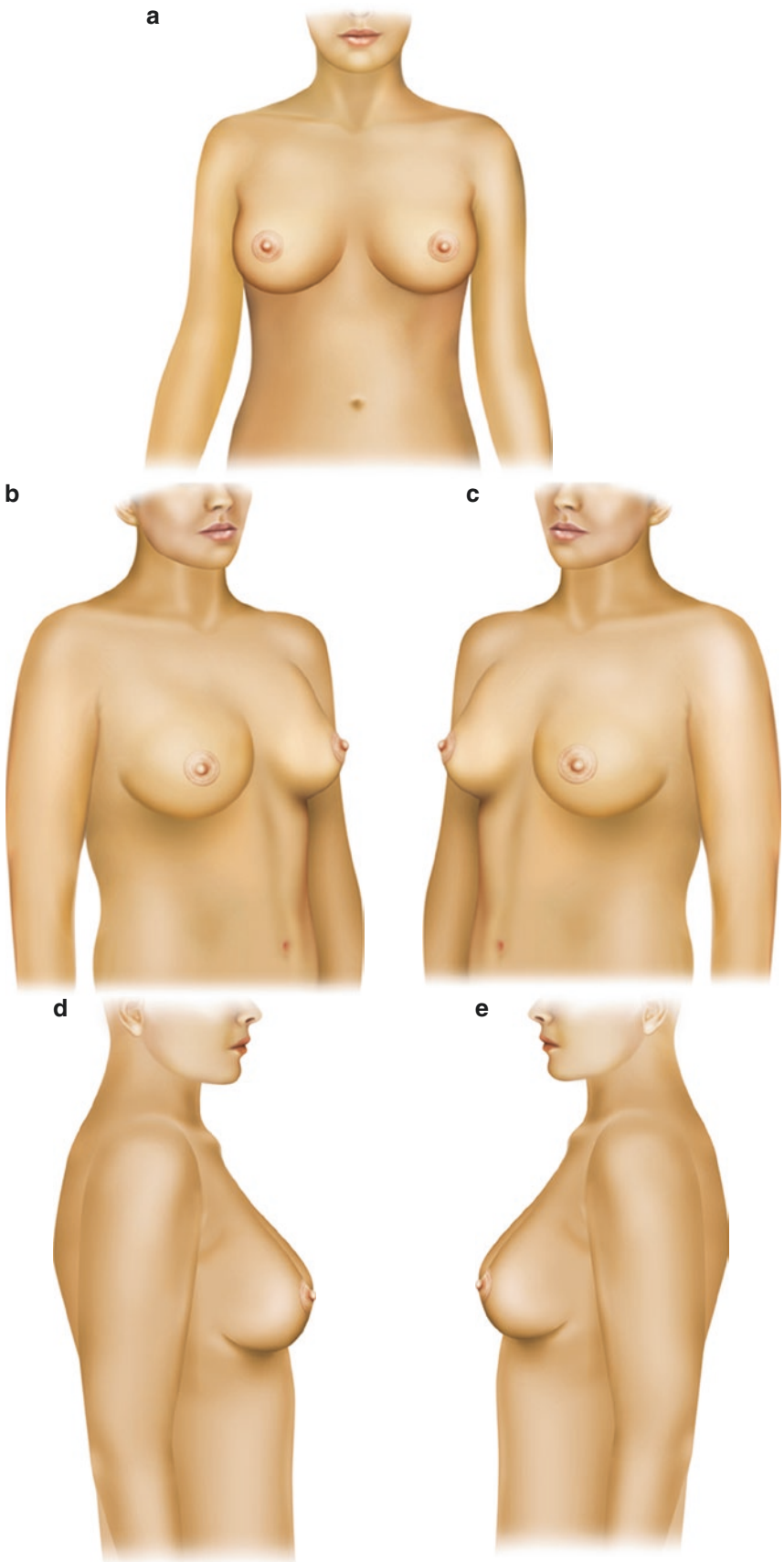

Fig. 9.3 Clinical photographs in the following positions: (**a**) anteroposterior, (**b**) right oblique, (**c**) left oblique, (**d**) right side, (**e**) left side

evaluation, because it is able to calculate measures and carry out clinical analyses in *x*, *y*, and *z* coordinates (three-dimensional). This triangulation allows the creation of 3D images [15].

The 3D image was first described in 1994 to diagnose ortho-dental conditions. It was initially used to highlight facial asymmetry and subsequently used to show alterations in the body contour [16, 17].

In breast surgery, the 3D images help in determining the volumes and shapes of the breast, estimate the differences, and allow the projection of results after the surgery [18]. This tool must be used as an auxiliary, and the virtual post-surgery results must not be promises of actual results. Numerous variables may interfere in the final result (age, BMI, ethnicity, height, gender, quality of breast tissue, lactation period, among others) [19].

It is important to observe the limitation of the use of these images, which still bump into cost, quickness and capture of image processing, portability, and special characteristics of the images [19, 20].

The 3D image is a tool which assists the surgeon in his decisions, besides being an important form of marketing. The quick advance of technology will provide a more efficient communication between the doctor and the patient, allowing a more precise and effective instruction.

The ultimate objective is to bring about a more satisfactory result for the patient.

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