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A large body of social psychological research developed over the past 50 years has confirmed the importance of physical appearance in daily life. This comprehensive body of research can be summarized with two general statements:

1. Individuals who are judged to be more physically attractive are assumed to have more positive and desirable personality characteristics.
2. Individuals who are seen as more attractive receive preferential treatment in a wide range of interpersonal interactions across the lifespan.

Whether we like to admit it or not, the evidence that our appearance impacts our lives is compelling.

A discussion of the role in physical appearance in the human experience also has to include a consideration of Darwin's theory of natural selection, perhaps the earliest scientific acknowledgment of the importance of physical appearance. According to the theory, the goal of all species is survival through successful reproduction. Identification of a mate who can optimize the results of reproduction is a central part of the process. To that end, specific physical characteristics have evolved to signal reproductive capability to others. These characteristics, particularly those that suggest the potential for healthy reproduction, serve as the foundation for what is considered attractive in another member of the species.

When applied to facial appearance, the characteristics of youthfulness, symmetry, and averageness have been most commonly associated with facial attractiveness. The development of adult facial features at puberty for both women and men signals reproductive potential to others. These features also may suggest reproductive health as expressions of normal levels of testosterone and estrogen. Clear skin, bright eyes, and lustrous hair draw attention to the youthful face. While a youthful facial appearance is considered attractive, an aging appearance typically is not. Ratings of attractiveness of males and females typically decline with age; the relationship is stronger for women than men.

Symmetry of facial features across the midline also is associated with increased ratings of attractiveness. Evolutionary theorists believe that the ability to develop symmetrical features in an environment full of pathogens is conferred upon only the healthiest of individuals. Similarly, averageness, with respect to the size of individual facial characteristics, also is associated with ratings of attractiveness. Composite faces made up of hundreds or thousands of individual faces via computer technology (and, therefore, believed to represent "average" facial features) are judged as more attractive than the individual faces that make up the composite. The most beautiful of the combined faces for women reflect a petite face with a smaller-than-average mouth and jawline, full lips, and pronounced eyes and cheekbones. Many surgical and minimally invasive treatments performed on the face are undertaken to help an individual look more youthful and/or enhance facial symmetry.

With these elements of evolutionary theory and social psychological research on appearance in mind, the popularity of aesthetic treatments is not particularly surprising. While decades ago an individual's interest in improving his or her appearance may have been seen as being symptomatic of excessive vanity, narcissism, or other deep-seated psychopathology. Today, it also can be seen as a more adaptive and potentially psychologically healthy behavior, akin to other self-improvement strategies such as eating a healthy diet and exercising regularly.

2.3 Psychological Characteristics of Aesthetic Surgery Patients

A sizable body of research starting in the 1960s has investigated the psychosocial characteristics of persons who present for aesthetic surgery. The first studies in this area relied heavily on clinical interviews of patients and described them as having high rates of psychopathology, including mood and anxiety disorders as well as personality disorders. All of these conditions were believed to be associated with poor postoperative psychological outcomes. Subsequent studies have included the use of standardized psychometric measures rather than or in addition to clinical interviews of prospective patients. These studies typically have found less psychopathology. Unfortunately, both sets of studies suffer from methodological problems that have made resolution of these conflicting findings difficult.

In the past 20 years, advances in the use of psychometrically validated measures have improved the quality of much of the research done in this area. In particular, a number of psychometrically sound patient-reported outcomes measures specifically designed for plastic surgery patients have been developed. These measures have focused on the assessment of quality of life, self-esteem, and body image in patients before and after surgery. Studies using these studies have largely found that patients typically report deficits in these areas prior to surgery.

2.4 Body Image

Over the past two decades, body image has been the psychological construct that has received the most research attention in the aesthetic surgery literature. Dissatisfaction with one's facial appearance and body image is believed to be the primary motivator for both surgical and minimally invasive treatments of the face and body.

There are several definitions of the construct. Cash and Pruzinsky defined *body image* as the perceptions, thoughts, and feelings associated with one's body and bodily experience. This definition captured the multidimensional nature of body image, including both the manner in which an individual objectively appears to others, but also the manner in which a body moves in time and space. These physical perceptions subsequently interact with thoughts and feelings about the features of one's appearance. Unfortunately, this definition does not specifically highlight body image behaviors, such as grooming habits and clothing selection, as well as more profound behaviors, such as those seen with aesthetic surgery. More recently, Cash and Smolak described body image as the "psychological experience of embodiment." This succinct description leaves the reader with a sense of the important role that body image plays in quality of life, self-esteem, and the overall human experience.

Much of our understanding of body image comes from a cognitive-behavioral theoretical model, one of the dominant theoretical models of psychology for the past several decades. The model describes the perceptual, cognitive, affective, and behavioral aspects of body image; it also accounts for *historical* and *proximal* influences of the construct. Historical influences include an individual's physical characteristics, personality traits, and interpersonal experiences. Proximal influences include cognitive processing of appearance-specific information from the

environment that, along with more general cognitive processes, lends “meaning” to situations and events.

These historical and proximal variables influence two fundamental body image dimensions. One is the degree of *investment* in one's appearance. Some individuals are highly invested in their appearance (those who carefully groom themselves before leaving the house); others are far less invested (those who are comfortable going out in mismatched clothes or without grooming). The second dimension is the degree of *dissatisfaction*. This dissatisfaction is believed to fall on a continuum. Likely, very few individuals are completely satisfied with their appearance on a daily basis. Most individuals likely can identify features that leave them dissatisfied. They may camouflage these features from others (through makeup and/or clothing), but this dissatisfaction does not routinely impact daily functioning. Others who are more dissatisfied may exhibit more significant behavioral change in response to their dissatisfaction. It is likely these individuals who are most likely to seek and benefit from aesthetic procedures. Finally, other individuals may exhibit a more extreme level of body image dissatisfaction that may be representative of BDD or other forms of formal psychopathology.

In general, there is consensus among thought leaders in the field that individuals who seek and receive aesthetic procedures report both heightened investment in their appearance as well as higher levels of dissatisfaction. This relationship also has been supported by research. Individuals who seek aesthetic procedures, both surgical and nonsurgical, typically report heightened body image dissatisfaction preoperatively. This dissatisfaction is typically centered upon concern with the specific feature to be improved with treatment. Thus, some degree of body image dissatisfaction is believed to be a prerequisite to aesthetic surgery.

2.5 Formal Psychopathology among Aesthetic Surgery Patients

Given the number and diversity of individuals who seek aesthetic procedures, all of the psychiatric diagnoses can likely be found within the patient population and a busy clinical practice. However, three disorders—BDD, eating disorders, and depression—likely warrant the greatest attention from aesthetic surgeons and their team members.

2.5.1 Body Dysmorphic Disorder

BDD is a manifestation of extreme body image dissatisfaction. It is defined by the American Psychiatric Association as a preoccupation with a slight or imagined defect in appearance that leads to substantial distress or impairment in social, occupational, or other areas of functioning.

The disorder was not formally recognized until 1987. Nevertheless, the aesthetic surgery and dermatology literature has included case reports of “minimal deformity,” “insatiable,” and “dermatological nondisease” patients as early as the 1960s. These individuals sought procedures to improve slight or imagined defects and were often dissatisfied with their results. While the incidence rate of BDD in the general population is believed to be between 1 and 2%, a number of studies conducted throughout

the world have found that 5 to 15% of cosmetic surgery patients appear to have some form of the disorder. Although persons with BDD typically report concerns with their skin, hair, and nose, any body part can become a source of preoccupation.

Persons with BDD frequently seek cosmetic medical treatments as a means of improving their perceived defects. More than three-quarters of persons with BDD report a history of aesthetic treatments. Unfortunately, most evidence to date suggests that aesthetic procedures are inadvisable for patients with BDD. Most patients report being dissatisfied with the outcome of treatment, and two large studies have found that greater than 90% of persons with BDD report either no change or a *worsening* in their symptoms following aesthetic treatments. A handful of small studies, however, have found some degree of improvement in symptoms in patients with mild to moderate forms of BDD. Also of note, a number of studies have documented high rates of suicidal ideation, suicide attempts, and self-harm behaviors (e.g., “do-it-yourself” surgery) among patients with BDD. There are also reports of patients with BDD who have threatened to sue or physically harm aesthetic treatment providers. In light of these issues, there is consensus that aesthetic treatments likely should be contraindicated for persons with BDD.

2.5.2 Eating Disorders

Extreme body image dissatisfaction is a symptom of both anorexia and bulimia nervosa. Women (and men) with both conditions may mistakenly believe an aesthetic treatment will improve their intense dissatisfaction with their bodies. Eating disorders may be a particular concern for individuals who seek body contouring procedures, including liposuction and abdominoplasty as well as breast augmentation. Patients may mistakenly believe that these procedures can reshape their bodies in a way that restrictive eating and/or maladaptive compensatory behaviors cannot. Women who present for cosmetic breast augmentation are frequently below average weight and report greater exercise compared to physically similar women not seeking breast augmentation, both of which also may be suggestive of eating psychopathology. Unfortunately, the study of the relationship between eating disorders and other cosmetic procedures has been limited to small case series.

2.5.3 Depression and Suicide

The presence of major depression or other mood disorders also warrants particular attention. Population estimates suggest that approximately 10% of adults are suffering with depression at any point in time and approximately 20% are using an antidepressant medication. Studies have suggested that the rate of usage among aesthetic surgery patients is higher and perhaps double that of the general population. Women seeking breast augmentation also have been found to report a higher rate of outpatient psychotherapy and psychiatric hospitalizations.

Of greater relevance, seven epidemiological studies have found an association between cosmetic breast implants and suicide. Across these studies, the rate of completed suicides was two to three times higher among implant recipients than estimated rates in the general population. Explanations of this relationship have largely focused on the preoperative psychosocial status and functioning of the women. Women who undergo breast augmentation



Fig. 3.12 Red shading represents the selected region used by a camera to determine the correct exposure. **(a)** Evaluative metering. **(b)** Center-weighted metering. **(c)** Spot metering.

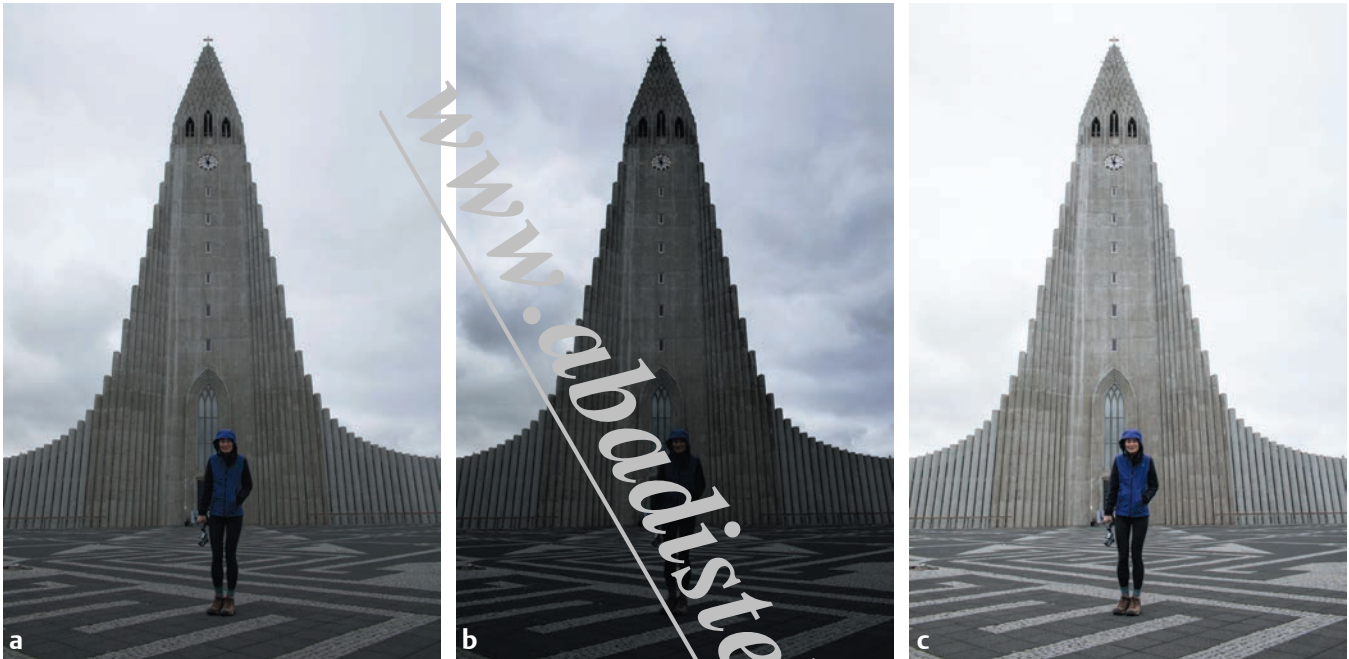


Fig. 3.13 Exposure compensation allows detail to be revealed in regions of interest. **(a)** Using the default exposure setting, the building and person are underexposed and the clouds are overexposed. **(b)** Setting $-1 f$ -stop exposure compensation reveals detail within the clouds. **(c)** Setting $+1 f$ -stop makes the building detail visible and gives the person's face a natural appearance.

noisy photographs that are less useful. In the hospital setting, it is often helpful to set exposure compensation to $+2/3$ or $+1 f$ -stop.

3.4.4 Postprocessing

Despite careful planning, in some instances the ideal exposure is not always obtained, resulting in unusable photographs. Fortunately, powerful programs are available to rescue such photographs through *postprocessing*, referring to the process of adjusting an already-captured image to achieve a desired appearance, without manipulating the content of the photo. Although powerful image manipulation software is available, it is crucial not to create misleading appearances or enhance results. Instead, the goal should be to correct for suboptimal lighting conditions and/or reproduce lighting conditions to allow comparison between photos.

The most useful and high-yield basic adjustments include white balance and exposure correction. Sharpening and vignette correction can add subtle but significant refinement. For intraoperative photos it is helpful to darken the *highlights*, lighten the *shadows*, and selectively decrease red saturation to allow details within bloody surgical wounds to be visible. Local adjustment masks can be used to correct for suboptimal lighting and reveal detail within shadows. Combined, postprocessing adjustments can rescue a poor photograph as in **Fig. 3.14**.

When selecting postprocessing software, it is recommended to use programs with *nondestructive* editing, in which the original photo remains intact and can be restored. Editing is stored separately in a separate file or program catalog. Using such software, a series of adjustments can be stored as a “shortcut” for different lighting situations, for instance “clinic,” “operating room with flash,” “operating room without flash,” and so on, and photos can be processed

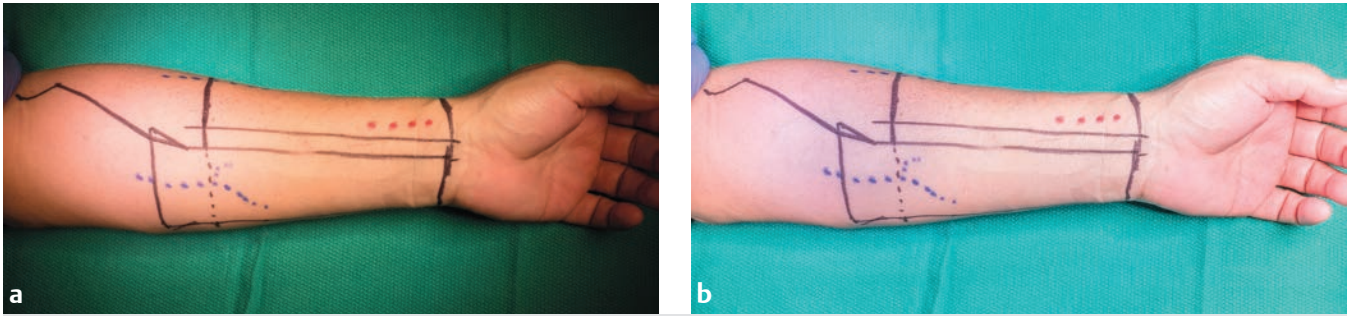


Fig. 3.14 (a) Original photograph taken with suboptimal lighting conditions, resulting in uneven lighting and unnatural color. (b) Postprocessing the raw format file allows for correction of color, exposure, and uneven lighting distribution.



Fig. 3.15 Example of postprocessing. (a) The unprocessed raw image of the same scene as in Fig. 3.13, exposed at a level between those of Fig. 3.13a and Fig. 3.13b, appears dull and washed out. (b) After postprocessing correction, the texture and detail are revealed vividly within both the building surface and the clouds, a result that could not have been obtained with exposure compensation alone.

quickly and efficiently. When exporting photos, it is recommended to remove file metadata so as to remove GPS information, time/date information, and other identifiable characteristics.

3.4.5 Compressed vs. Uncompressed vs. Raw Format

Postprocessing provides the best results when working with uncompressed raw format files, which are the digital equivalent

of film negatives and retain all original data. Photos are completely uncompressed and retain the most information, so there is no data loss in shadows or highlights, as with formats compressed for the sake of file size. Without editing, photos often appear washed out and faded. However, these photos have the most potential; after processing parameters such as exposure, white balance, contrast, and other adjustment, these may produce the most dramatic photos once edited (**Fig. 3.15**).

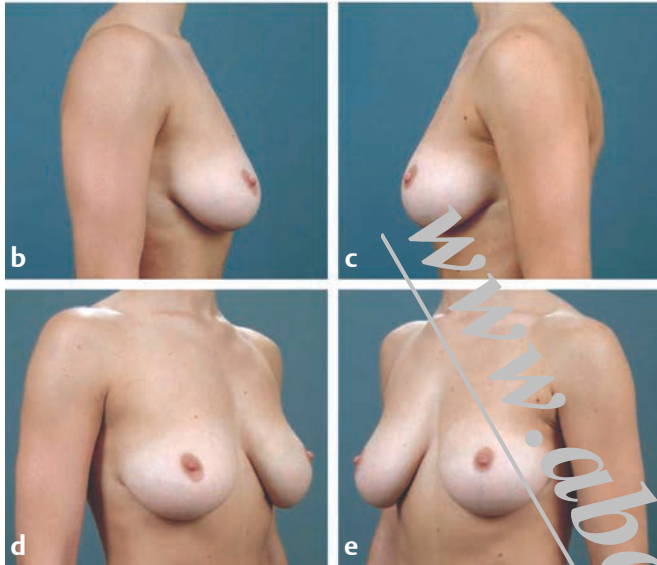


Fig. 3.22 (a–e) Standardized views of the breasts. Placement of the hands on the hips for the lateral views is useful to show any postoperative scars, the inframammary fold, and other features. Note that the shoulders are aligned with the top of the photograph.

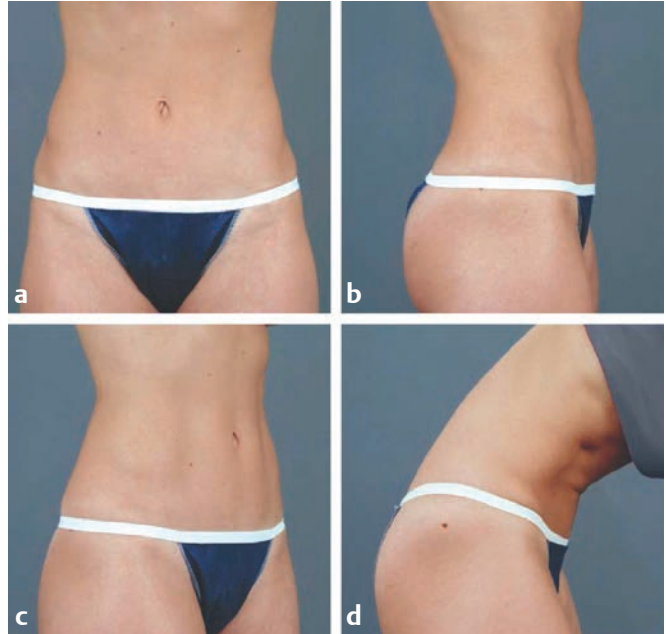


Fig. 3.23 (a–d) Standardized views of the lower trunk and abdomen. The diver's view (d) highlights the abdominal soft tissue.

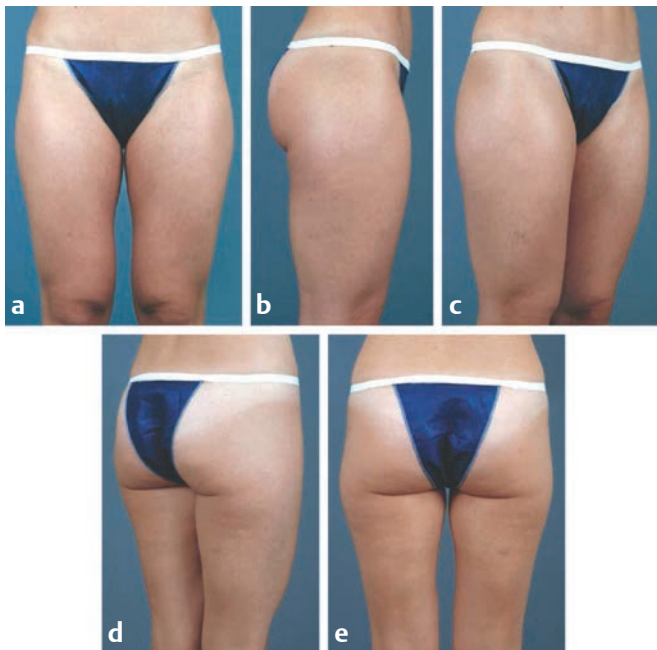


Fig. 3.24 (a–e) Standardized half-view of the (upper) lower extremity.



Fig. 3.25 The flash position relative to the lens casts differing shadows and should be mounted on the same side of the lens as the patient's anterior. The top row shows a frontal view with the flash mounted to the right (a), left (b), and above (c) the patient. Note the distracting shadows cast with the flash mounted toward either side. The bottom row shows a lateral view with the flash mounted toward the patient's posterior (d), anterior (e), and superior (f).

to discern. These flashes are useful for close-ups of detail or difficult-to-illuminate areas, such as with dental or dermatologic purposes, but are not typically used to photograph the body or extremities.

3.6.3 “Studio Effect” Photography

Certain instances call for meticulous photographs with backgrounds completely free from distraction and evenly illuminated details. Setup requires multiple light sources at varying angles for elimination of harsh shadows. Backgrounds are meticulously neat without distraction or reflection, such as with a velvet background or a plain blue wall (Fig. 3.26).

Alternatively, the background can be eliminated completely as in Fig. 3.27. This studio effect is accomplished by illuminating the subject with high-intensity light while providing as little light as possible to the background, table, and nearby elements. By properly metering the photograph to the well-lit subject, typically with the aid of center- or spot-metering, the background and other elements appear far underexposed in relation and appear



Fig. 3.26 A simple blue background with evenly-distributed soft lighting from multiple directions creates a pleasant appearance without distracting shadows.



Fig. 3.27 An example of a textbook-style/studio-style photograph with an absent background. This example shows medial femoral condyle free flap anatomy prior to harvest.

black. This effect is best accomplished when the background and floor are as far from the subject as possible, since less light will reflect from the subject and provide less illumination.

Focused high-intensity light can be accomplished with external flashes or spotlights. Operating room overhead lights function well as spotlights and, when carefully aimed at the subject, can provide sufficient lighting, as in Fig. 3.11. Lights should be aimed to create smooth, even lighting. It is sometimes helpful to move lights farther from the subject to allow greater diffusion of the spotlight.

3.6.4 Intraoperative Photography

Intraoperative photography can be divided into two types: staged and nonstaged, “action” shots.

With appropriate staging, distractions are removed from the operative field, including instruments and cables, as shown in Fig. 3.28. Blood is wiped clean from the area. The area of interest is surrounded using clean, dry operative towels to mask the wrinkled, blood-speckled operative drapes. If flash is used, then the operative lights should be removed from the field because of uneven light intensity and difference in light temperature and hue. Alternatively, operative lights may be used as spotlights without the use of flash.

Staging of photographs can be time-consuming and disruptive to the flow of the procedure. Alternatively, “action” shots taken throughout the procedure capture key steps and fine detail without repeated pauses. Results are best with telephoto lenses and center- or spot-metering and overhead operative light, as shown in Fig. 3.29.

3.7 Concluding Thoughts

Photography remains one of the most essential tools available to a plastic surgeon. Mastery of fundamental principles underlying photographic exposure permits skillful use of advanced concepts, allowing the eye-catching capture of crucial details. Understanding the technological evolution in photography permits post-processing corrections to bring the photographs



Fig. 3.28 An example of a staged intraoperative photograph. The operative field has been cleansed, and the tendon grafts are lined up next to the hand.

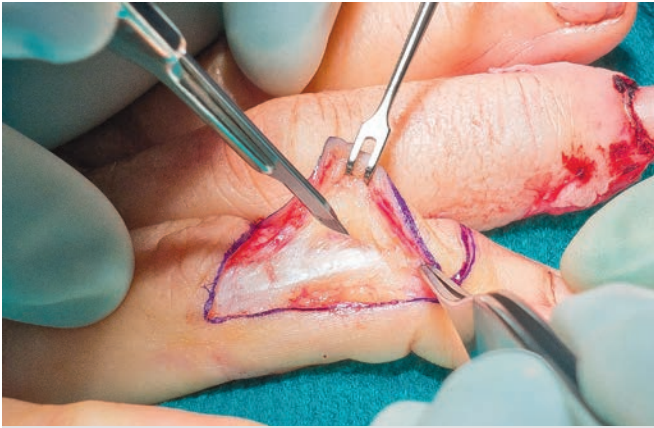


Fig. 3.29 An intraoperative “action shot” that does not disrupt the flow of surgery. In this case, a cross-finger flap is being harvested. The wispy, loose areolar tissue and fine capillaries are visible and not overblown through the correct use of metering and exposure.

to true-to-life appearance for the sake of anything from plain documentation to portfolio marketing or publication. As technology continues to evolve, novel considerations will undoubtedly arise, but fortunately the underlying concepts will endure perpetually.

Clinical Caveats

- The most useful clinical photographs are taken in a reproducible fashion using standardized patient positioning, lighting, and camera settings.
- Proper focal length should be chosen to minimize perspective distortion while using appropriate shutter speed and aperture to prevent motion blur and maintain a broad depth of field.
- The most reliable lighting is provided using external lighting (flash or light boxes) or overhead lights arranged purposefully.
- Simple postprocessing correction of white balance and exposure can dramatically improve the appearance and consistency of clinical photos.
- Camera choice is a personal preference, weighing convenience and portability versus image quality, camera size, and cost.
- All digital information should be stored in a protected, HIPAA-compliant fashion, ideally with multiple redundant backups. Higher-resolution files are recommended if practical.
- Adequate camera sensor resolution for publication is a lesser concern now, as newer cameras have far greater resolution than necessary.
- Facial photographs are best taken with a portrait lens of around 90- to 110-mm focal length to minimize distortion.
- When using a smartphone or point-and-shoot camera, the best results are achieved by stepping back from the subject and zooming in.

Suggested Reading

- [1] American Society of Plastic Surgeons. *Photographic Standards in Plastic Surgery*. Arlington Heights, IL: Plastic Surgery Educational Foundation; 2006
- [2] Hoffman WY. Photography in plastic surgery. In: Hentz VR, Mathes SJ, eds. *Plastic Surgery*. 2nd ed. Philadelphia, PA: Elsevier; 2006:151–165
- [3] Kinney BM. Photography in plastic surgery. In: Neligan PC, Warren RJ, eds. *Plastic Surgery*. Vol. 1: *Principles*. 3rd ed. New York, NY: Elsevier Health Sciences; 2012