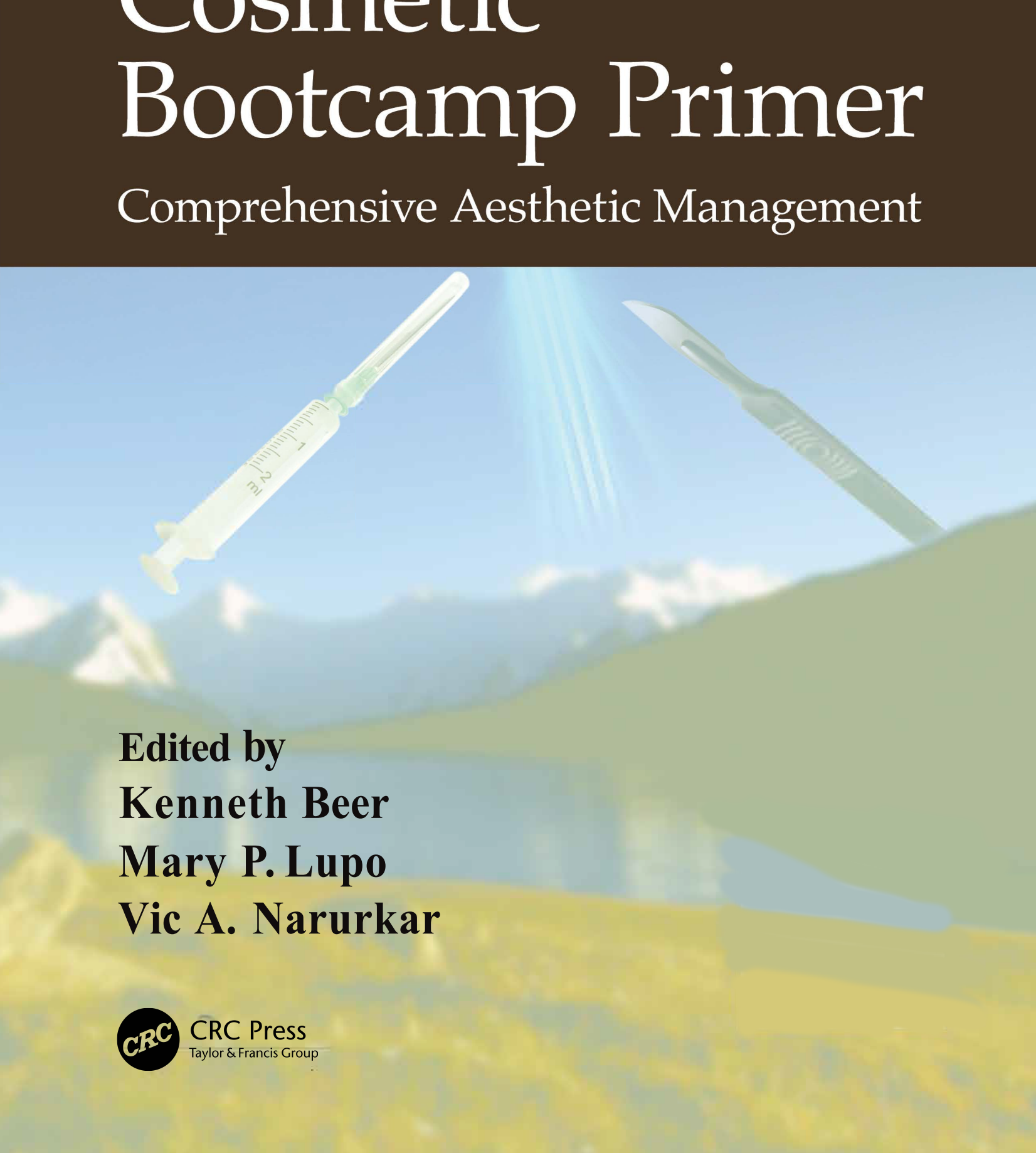
SERIES IN COSMETIC AND LASER THERAPY

Cosmetic Bootcamp Primer

Comprehensive Aesthetic Management



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Cosmetic Bootcamp Primer

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Cosmetic Bootcamp Primer
Comprehensive Aesthetic Management
With DVD

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Preface

The Cosmetic Bootcamp Meetings began as a way for colleagues in dermatology, plastic surgery, ophthalmology, and otorhinolaryngology to teach each other in a collegial environment. Cosmetic Bootcamp meetings are designed to provide core physicians (those in the specialties listed above) a forum to exchange ideas, explore new technologies and techniques, and discuss ways to improve patient care. In short, the focus is on advancing the science and outcomes using a multidisciplinary approach.

We include each of the core aesthetic specialties at our meetings in addition to this book since we believe that one specialty does not hold all the answers. Moreover, the most interesting courses at each of our meetings are those that include physicians from different specialties to provide their perspective on a single patient issue or aesthetic technique. This book attempts to capture the flavor of these interactions

Each chapter has what the editors consider essential information as well as a few "pearls". The goal of this is to provide the framework to understand the topic being discussed as well as the most salient, practical aspects of the chapter. While the book cannot provide the interaction that we see in our meetings, it does have an instructional DVD that helps bridge this gap. Following each meeting, the audience gathers to interact and ask questions about each lecture. Unfortunately, this is not possible with a textbook but most of the authors are participants at many meetings throughout the year and the reader is encouraged to ask him or her questions. Future versions of this text will include internet-based interactions that will foster these discussions. For those interested in a more direct interaction, please visit www.cosmeticbootcamp.com to see dates for upcoming meetings.

Kenneth Beer MD PA
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Supplementary Resources Disclaimer

Additional resources were previously made available for this title on DVD. However, as DVD has become a less accessible format, all resources have been moved to a more convenient online download option.

You can find these resources available here: http://resourcecentre.routledge.com/books/9781841846989

Please note: Where this title mentions the associated disc, please use the downloadable resources instead.

1 The role of the aesthetic specialist

Kenneth Beer

The Cosmetic Bootcamp arose from a simple concept asked at a lecture that I was delivering to a group of people attending a cosmetic meeting. An audience member responded to a statement that I made to the effect that the techniques I was discussing were best reserved for those individuals trained during a residency or fellowship to understand the anatomy and technical considerations involved. On the podium, I was asked, "If people can not learn these techniques at a meeting like this, where then should they learn them and what mechanism exists to train esthetic physicians?" Taken slightly aback, I responded that the mechanism, as I understood it, for training cosmetic physicians exists and is known as the residency or fellowship in an appropriate specialty. However, the question made me think about the role of specialists in aesthetic medicine and surgery. Ultimately it was the impetus to create a meeting where we could have an audience comprised of people that had a common level of education and skills and whom we could expose to new ideas that would enable them to advance.

Specialists in medicine have traditionally been individuals who have advanced skills and/or training in a particular discipline. As medicine evolved and broader fields became more refined, some of the practitioners were "grandfathered" in as specialists. In dermatology, there are several examples of this, including those dermatologists who became certified as specialists in dermatopathology without taking the certification exam. Plastic surgery, head and neck surgery, and ophthalmology have each branched into several subspecialties whose practitioners have additional training and skills beyond the scope of the daily activities of most of the generalists in the field. In each of these areas, the specialists drive a great deal of the research and advancements in the field.

There are now several physicians as well as several more non-physicians performing cosmetic procedures far different from anything they trained in during their residency. Many of these physicians can perform basic cosmetic procedures such as injecting the glabella with botulinum toxins or spackling the nasolabial creases with soft tissue augmentation products. Some will perform enough procedures and attain the education to excel in these procedures. However, some of these physicians are also delivering babies or taking care of hypertension. While they may perform fundoscopic and otologic examinations, they typically lack the advanced skills of someone trained specifically to deal with these areas. So it is with the specialists in aesthetic medicine.

What are the effects of non-specialists treating patients in this field? Usually, the consequences of the treatments are negligible and there should be no implication that specialists are all particularly gifted and free from cosmetic fiascos. One advantage that specialists have is that they typically understand advanced techniques, anatomy, and methods of combining treatments to optimize patient outcomes. Another is that they have frequently worked with other related specialties during the course of their training as well as in practice so that they are able to recognize the limitations of their own specialty and refer to a colleague when appropriate.

The role of the dermatologist, ophthalmologist, otorhinolaryngologist, and plastic surgeon should be to assess the various components of aging and provide a roadmap of options for the patient and to advance the specialties through research and educational activities. In the office, these specialists can help patients discuss the range of treatments available from lasers to intense pulsed lights, chemical peels, botulinum toxins, fillers, volumizers, cosmeceuticals, and surgery. Specialists should be able to discuss these alone and in combinations that are beyond the scope of those not trained during a formal residency or fellowship. Some of these specialists have broad areas of overlap but others do not—for instance, not all of these specialists will perform a facelift or consider themselves experts at injecting. These specialists have a responsibility to help the patient find the right person for their particular need.

Specialists also have the responsibility to tell patients what they should not do. For some this means that no amount of botulinum toxins are going to make them look like they did when they were 20; for others, it is the reality that using a cream may be enough to accomplish some of their goals in a gradual, cost-efficient manner. Patients with unrealistic expectations or body dysmorphic disease should be assessed and should not be treated. There are times when they will mask their symptoms and get treated with unfortunate results for all concerned.

For physicians who have participated as faculty or authors, the role of specialists in advancing the fields they are in as well as training the next generation of physicians and physician extenders is also a vital facet of their specialty. The leaders in the fields spend countless hours writing and preparing lectures to facilitate the education of their colleagues.

One question that arises during any discussion of the role of aesthetic specialists is a salient one: Why bother with aesthetic specialists at all? This is asked by other physicians, medical economists, and patients concerned by the lack of "seriousness" of aesthetic medicine. My own belief is that there are three primary reasons. The first is that, since the beginning of time, man has always sought to improve his or her appearance and aesthetic medicine and surgery is a natural evolution of this process and one that will continue irrespective of what some may think. A second reason is the unintended consequences of the aesthetic technologies that evolve. Lasers once used to treat wrinkles on the face are now routinely used to treat debilitating and disfiguring burns. Fillers may be used to reconstruct areas damaged by trauma, and botulinum toxins are used to treat headaches, myofascial pain, prostate hypertrophy, spasticity associated with cerebral palsy and a host of other medical conditions. The third reason is that many patients that have an aesthetic procedure not only look better but feel better about themselves and have higher self-esteem and job performance. From botulinum toxins to lasers to fillers to breast augmentation, the properly performed procedure in the properly selected patient may significantly improve the quality of that person's life.

Specialists have the obligation to provide treatments better than poseurs. They need to contour the face instead of spackling lines. Perhaps as important is their role in education and advancing the various specialties. This includes training other specialists and students interested in the fields. The goal of any physician is to help patients and advance the field. I would hope that this book encourages readers to take the best care of their patients and educates those who need to be trained.

2 The size and scope of the aesthetic marketplace

Neil S. Sadick

THE AESTHETIC MARKETPLACE

Aesthetics is a broad field, with physicians and trained clinical professionals of many different interests and areas of expertise. The spectrum ranges from plastic surgeons that perform reconstructive surgery and invasive procedures with lengthy recovery to dermatologists, skilled in non-invasive body contouring, laser/light rejuvenation, and injectables, to aestheticians addressing topical skin concerns and facilitating maintenance. The shared goal of aesthetics professionals is to create beauty and repair damage. However, their diverse education backgrounds and range of expertise create a vast assortment of procedures that are offered for aesthetic purposes. There is a growing demand on the part of the cosmetic consumer for holistic, aesthetic care—that is the integration of surgical and nonsurgical procedures at a medical aesthetic center. At such facilities, often termed *medical spas*, physicians and aestheticians can align their services into a synergistic platform to satisfy their patients' desire for a continuum of care.

BACKGROUND

The medical spa is a term applied to aesthetic centers that offer services intended to be administered by a medical professional. The designation of "medical spa" attempts to differentiate the facility as more efficacious and therapeutic than commonplace "day spas." There are several types of medical spas that include those that are run and owned by a physician (typically a specialist in plastic surgery or dermatology) and those that are owned by an entrepreneur with physician as medical director (either on- or off-site). Typical core services offered at most medical spas include microdermabrasion, chemical peels, medical facials, botulinum toxin, injectable fillers, hair removal, and photorejuvenation with laser and light sources. In addition, many medical spas commonly provide body contouring treatments such as cellulite reduction and skin tightening, injection lipolysis, acne treatment, tattoo removal, laser resurfacing, sclerotherapy, and leg vein removal. A few medical spas are also able to offer on-site cosmetic surgery (e.g., rhinoplasty, blephroplasty, brow, and facelifts), liposuction, and laser-assisted lipoplasty (Table 2.1).

The Cosmetic Medicine Task Force (1) developed a classification system to educate the public on the outcomes and relative risks of various cosmetic procedures (Table 2.2). For example, "non-invasive" procedures do not penetrate the dermis and pose virtually no risk to health, while "minimally invasive" procedures do penetrate the skin and are associated with a slight health risk. In general, the closer the on-site involvement with a physician, the more likely "aggressive," or "invasive" procedures are offered.

The services offered by medical spas continue to evolve as novel technologies for aesthetic indications continue to be developed. The trend in demand has been toward nonsurgical procedures, and the top 10 patient-requested procedures in 2008 are shown in Table 2.3. It is interesting to note that many of the most popular procedures performed today did not exist 15 years ago or existed in a very early developmental state. For those contemplating expanding their aesthetic menu of services, it is important to stay within the top 10 most requested procedures to stay profitable as well as foresee the emergence of more powerful and efficacious approaches and invest accordingly.

The aesthetic industry is projected to increase by 9% a year (2,3) and offers a lucrative and stable opportunity for expansion. Although the aesthetic services in a medical spa are often administered or closely supervised by a physician, the organization and operation of an aesthetic medical center differs significantly from a typical doctor's office. Figure 2.1 illustrates the primary difference between a traditional medical practice and an aesthetic practice—the flow and retention of patients. In a traditional model, patients flow into the office via insurance accepted by the physician. In the aesthetic model, patients are self-referred or referred by friends and family. As such, patients/clients can come through various channels and the practice should promote itself to expand its footprint. The variety of services offered at an aesthetic medical center provides an opportunity for current patients to move up the cosmetic pyramid to more advanced procedures. The goal of any marketing program is to engage patients into the aesthetic practice at the basic level of care (facials, chemical peels, and low risk treatments) when topical and maintenance services are the patients' primary need (due to age or financial restrictions) and migrate them into other physician administered services including surgery as they require them.

CORE SERVICES

Microdermabrasion

Microdermabrasion is an exceedingly popular procedure for superficial skin resurfacing. It achieves improvement in scars, roughness, mottled pigmentation, and overall appearance, but not rhytids. The procedure involves the deposition of microcrystals, usually aluminum oxide (sodium chloride, magnesium oxide, and sodium bicarbonate are other options), on the surface of the skin with rapid strokes of the handpiece (4). Meanwhile, an aspiration tube attached to the handpiece vacuums the crystals and skin debris. The skin depth of the procedure is established by the strength of crystal flow, speed of handpiece movement, and the number of passes of the target region (4). Histology studies of microdermabrasion revealed the following changes: thickening of the epidermis and dermis, flattening of the rete pegs, vascular ectasia and perivascular inflammation, and hyalinization of the papillary dermis with newly deposited collagen and elastic fibers (5). It has been suggested that microdermabrasion produces clinical improvement by inducing molecular changes within the dermis that trigger dermal collagen remodeling and repair. Recent studies have reported that treatment activates the expression of cytokines AP-1, NF-κB, TNF-α, and IL-1β, which collectively serve to upregulate the expression of various connective tissue degrading enzymes (6).

There are hundreds of different microdermabrasion machines on the market. In general, a comprehensive listing of available technology can be found in the *Aesthetic Buyers Guide*, a bi-monthly trade publication. The Food and Drug Administration (FDA) classifies microdermabrasion units as class 1 medical devices. As such, the machines can be sold without demonstration of clinical efficacy and operated without any medical supervision, as long as the procedure only removes the stratum corneum (7). There is a wide variation in the training of providers for this procedure and it is important to be aware that aggressive treatment can cause excesses in exfoliation, increased redness and rosacea, and dermatitis flares. Microdermabrasion is projected to remain a mainstay of "aesthetician-based" adjunctive care. The demand and increasing popularity of the procedure has resulted in the development of at-home microdermabrasion kits, although not as powerful as the technology available in professional aesthetic settings.

Table 2.1 Procedures Offered in Medical Spas

Core services	Common procedures	Less common medical procedures
Microdermabrasion	Cellulite reduction	Sclerotherapy
Chemical peels	Tissue tightening	Laser leg vein removal
Medical facials	Laser resurfacing	Photodynamic therapy
Botulinum toxin	Injection lipolysis	Tattoo removal
Injectable fillers		Cosmetic surgery
Hair removal		Liposuction
Photorejuvenation		Laser-assisted lipoplasy

Table 2.2 Classification System for Cosmetic Procedures

Non-invasive	Minimally invasive	Moderately invasive	Invasive (surgical)
Body wraps	IPL	Botulinum toxin	Face lifts
Facials	Microdermabrasion	Injectable fillers	Rhinoplasty
Deep-tissue massage	Laser hair removal	Laser skin resurfacing	Liposuction
	Laser leg vein removal	Chemical peels	Abdominoplasty
	Non-invasive fat reduction (e.g., High-intensity focused ultrasound or low level light therapy)	Skin tightening (radiofrequency and infrared)	Breast lifts, augmentation, reduction, and reconstruction
	Cellulite reduction	Injection lipolysis	Arm and thigh lifts
		Sclerotherapy	

Table 2.3 Top 10 Requested Procedures in 2008

1. Botulinum toxin
2. Laser hair removal
3. Injectable fillers
4. Chemical peels
5. Laser resurfacing
6. Microdermabrasion
7. IPL
8. Sclerotherapy
9. Breast augmentation
10. Liposuction

Chemical Peels

Chemical peels are typically used for treatment of acne and enlarged pores, melasma, anti-aging, and to enhance the results of other aesthetic interventions, most commonly laser treatments. Three types of peels are readily available and classified based on the depth of the peel: superficial/mild, medium, and deep. Chemical peels performed in the medical spa are usually of the superficial or "lunchtime" variety without excessive post-procedure downtime. Most medical spas use aestheticians or nurses for the administration of mild chemical peels. The more moderate-to-deep chemical peels should be administered by a physician or under the direct supervision of a physician due to higher potential for adverse events and skin sensitivity.

A variety of mild chemical peels are available including glycolic acid, trichloroacetic (TCA) acid, salicylic acid, pyruvic acid, resorcinol, and Jessner's solution (14% lactic acid, 14% resorcinol, and 14% salicylic acid) (8). Several proprietary peels are available including systems from Obagi and Theraplex (Melbourne, Australia). The indications for chemical peels are similar to microdermabrasion, but with considerable variation in efficacy and improvement based on depth of peel. Mild chemical peels are effective options for treating melasma in type IV-VI skin (9) and are considerably safer for this group than laser chromophore targeting. Moderate-to-deep peels are possible treatment options for patients wishing to target rhytids and achieve some degree of tightening.

Medical Facials

A facial is the most basic aesthetic service, typically comprising a deep cleaning, skin analysis (via a magnifying loupe), exfoliation (often with steam), extractions, massage, a mask to tighten pores, and moisturizer application. Medical facials could be defined as facials whose primary goal is to effect an improvement on the condition of the skin rather than deep cleaning and relaxation. Medical facials often focus on specific problems such as aging skin, large pores or acne, maintenance for rosacea, reduction of lines or wrinkles, reduction in hyperpigmentation, hydration, or combination of these conditions. The use of physician-dispensed products and a method of penetration that allows ingredients to penetrate more deeply in the dermis are commonly employed. Various methods to improve penetration are stratum corenum removal with chemical agents or microdermabrasion, ultrasonic devices, and heat or suction. Medical facials are mild treatments that do not claim lasting results but are appropriate adjuncts to other procedures and maintain and improve daily skin care regimens.

Botulinum Toxin

Botulinum toxin type A or BTX-A (BOTOX, Allergan, Irvine, California, USA; Dysport, Medicis, Scottsdale, Arizona, USA) is a purified complex of the neurotoxin, produced from the bacterium *Clostridium botulinum*. Originally approved for the treatment of blepharospasm and strabismus, off-label use began to produce reports of cosmetic improvement. Injections of botulinum toxins are frequently the entry point for patients into procedural aesthetic medicine.

In 1992, the first published cosmetic study reported that 16 out of 17 subjects had market improvement in glabellar wrinkles after BTX-A injections into the corrugators with results lasting for 3 to 11 months (10). Since then there have been multiple studies validating these effects and establishing optimum dosing guidelines and injection points, as well as demonstrating the prophylactic and anti-aging effects of this treatment (11–14). In April 2002, BOTOX Cosmetic received FDA approval for the treatment of moderate-to-severe frown lines of the glabella. In 2009, Dysport followed receiving the safe FDA approval. Both formulations are used off-label in other areas of the face/neck for aesthetic benefit and have become the most commonly performed cosmetic procedure. With several other formulations of BTX-A currently in development and undergoing FDA approval (e.g., Purogen, Xeotox) including a topical formulation (Reloxin), the market for BTX-A injections is only projected to grow (15).

Performing BTX-A injections requires a strong knowledge of anatomy, muscle function, and toxin diffusion patterns in the treatment area. Only dynamic wrinkles that are caused or worsened by muscle movement can be expected to improve with treatment. The most common treatment area is the upper third of the face including periorbital lines, frown lines in the glabella, and transverse lines across the forehead. With experience, providers can also treat vertical lines of the upper lip, jowl contour and platysmal bands, chin dimpling caused by

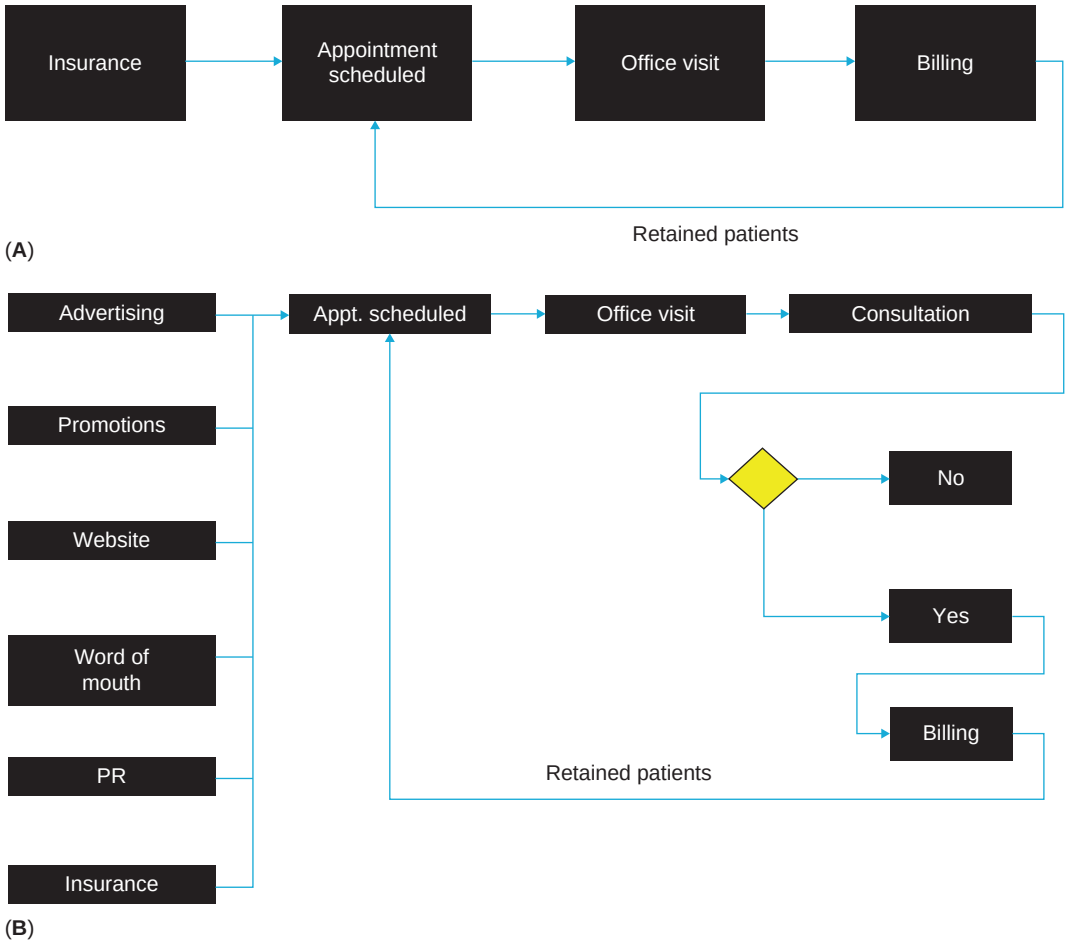

Figure 2.1 Business models of traditional medicine and aesthetics. (**A**) Traditional model; (**B**) Aesthetic medical spa model—yellow diamond indicates the decision to purchase by the patient and the opportunity to convert to billing.

mentalis, muscles exacerbating marionette lines, and other areas of the lower face and neck.

Unwanted local effects of BTX-A injection are generally transient. As with any injection, pain, bruising, and infection can occur. The most adverse events—aside from bruising—include asymmetry, headache, and pronounced lateral elevation of the brow. Brow and eyelid ptosis are more severe side effects, which occur in less than 1% of injections and are usually related to technique (16).

Injectable Fillers

Injectable dermal fillers have experienced a vast surge in popularity since the debut of injectable bovine collagen (Zyderm, Zyplast, Allergan, Irvine, California, USA) in the 1980s. Since then the demand and variety of products offered have only continued to grow with no signs of abatement. The advent of safer, longer lasting agents, as well as the increasing acceptance of and recognition of the significant enhancements that are able to be realized with these procedures strongly contribute to their popularity with both practitioners and consumers. Fillers are frequently the second procedure that cosmetic patients undergo after they have been treated with botulinum toxins and the two procedures are frequently utilized concurrently.

Initially intended for the correction of localized and fine facial lines, the current arsenal of products is able to address numerous aesthetic concerns both on and off the face. FDA-approved fillers fall into several classes: hyaluronic acids, collagen-based materials, calcium hydroxylapatite (CaHA), poly-l-lactic acid (PLLA), and polymethylmethacrylate (PMMA). All fillers are approved for nasolabial fold enhancement; however, many are widely used off-label for other procedures such as lip augmentation, brow elevation, marionette line correction, cheek and tear trough enhancement, and overall volume correction. Developed at the outset as a passive and resorbable correction, fillers have augmented their offerings to provide a biostimulatory and even in some cases permanent response. Biostimulatory fillers include Radiesse (BioForm Medical, San Mateo, California, USA) composed of CaHA microspheres in an aqueous carboxymethylcellulose gel carrier, and Sculptra (Dermik Laboratories, Berwyn, Pennsylvania, USA) composed of PLLA microparticles in a sodium carboxymethylcellulose gel. Both CaHA and PLLA particles are phagocytosed and become surrounded in a capsule of connective tissue cells, macrophages, lymphocytes, mast cells, and foreign body cells (17). As time passes, there is a fibrous-tissue response with collagen deposition providing sustained correction (18).

The injection of fillers requires an artistic aesthetic sensibility, excellent eye-hand coordination, and an intimate knowledge of facial anatomy, as necrosis due to vessel occlusion is possible. The necessary skills are difficult to obtain and require much experience. Injectable fillers are recommended for use by experienced dermasurgeons or by physician assistants or nurse practitioners who are under close supervision of a derma-surgeon. Combination treatments with several fillers classes as well as lasers have brought about the nonsurgical or "liquid" facelift—a treatment algorithm focused on global volume enhancement and age-prophylaxis. This sector of aesthetics is projected to experience heavy growth as new products and indications are continuously being developed.

Hair Removal

Lasers are a popular option in aesthetics for permanent hair reduction. The FDA defines this as "long-term stable reduction in the number of hairs regrowing after a treatment regime" (19). Laser hair removal first became available in the mid-1990s. As with almost all laser technologies, laser hair removal is based on the principle of selective photothermolysis (20). In the case of hair removal, the goal is to heat and destroy the follicular unit without damaging the surrounding tissue. The target chromophore is melanin in the hair follicle. The amount of melanin in hair and skin varies widely between individuals. Therefore, it is crucial to select the appropriate wavelength, spot size, and pulse duration based on the patient's skin type and hair color for safety and efficacy.

The first lasers were only effective in light-skinned and dark-haired patients. Advances in technology have allowed for safe treatments in darker-skinned patients and those with lighter colored hair. There are several different wavelengths and types of devices available, some of the most common offering are:

- *Ruby*—The ruby laser (694 nm) was the first laser widely used for hair removal (21,22). Although it was effective in lighter skinned patients, it is not used frequently today.
- *Alexandrite*—The alexandrite laser (755 nm) was introduced shortly after the ruby and is still used frequently today. Its longer wavelength allowed for deeper penetration and it could cautiously treat some darker skinned patients (23). Studies have reported a reduction up to 50% after only single treatment; and up to 95% hair reduction after multiple treatments, depending upon the number of treatments and body location (24,25).
- *Diode*—Treatment of unwanted hair with the diode laser (810 nm) has been demonstrated as comparable to those of the ruby or alexandrite lasers. After a single treatment, hair reduction of about 30% have been reported; and up to 84% reduction with multiple treatments (26). The diode should also be used with caution on darker phenotypes.
- *Nd:YAG*—The Nd:YAG laser (1064 nm) is the safest type to treat unwanted hair on patients with dark skin, but the laser does not provide an optimal wavelength for hair removal. Results can be achieved, but higher energies are necessary to achieve results due to lesser affinity with melanin. Reports have shown an improvement of about 50%, depending on the number of treatments administered and body location (27).
- *Intense pulsed light (IPL)*—IPL systems have a wavelength range from 550 to 1200 nm. Filters are used to cut off certain wavelengths depending on treatment indications. Bedewi reported a mean hair reduction of 80% after five IPL treatments (28).
- *Intense pulsed light and radiofrequency*—The combination of IPL/diode laser with bipolar radiofrequency (RF) is a recently developed dual energy treatment. The hair follicle is pre-heated by light or laser and then RF causes further injury. Because RF does not require a target chromophore, this was the first technology to effectively treat light-colored hair, including white (29,30), albeit at a lower efficacy.

The number of treatments necessary and the interval between treatments are important considerations of laser hair removal and depend on the body area being treated. Only hair in the anagen or growth phase can be effectively treated. Hair in the telogen or catagen phases of rest does not have a mature enough follicle to be treated. The length of time spent in each phase depends on the location of the hair. On the scalp, hair follicles spend up to 10 years in anagen, but on the trunk, brow, and limbs, anagen lasts no longer than 6 months. This variability in hair cycling explains the need for multiple treatments, the correct timing of treatments, and the inability to remove hair 100%.

Recently consumer demand has contributed to emergence of at-home hair removal technologies. These technologies are in their infancy and deliver significantly lower energy levels than their professional counterparts. Nonetheless, they present an important evolution of this aesthetic concern and can provide an "entry-level" service for clients who may not be ready for a professional treatment.

Photorejuvenation

Photorejuvenation refers to the use of lasers and light sources to remove unwanted epidermal pigmentation and reduce upper dermal telangiectasia to improve the texture and tone of the skin. These modalities utilize the principle of photothermolysis with the target chromophores of melanin for pigmentation and hemoglobin for telangiectasia. Several devices in this category have also been reported to improve superficial wrinkles and cause some skin smoothing.

IPL is the modality utilized most often for photorejuvenation and nonablative treatment of superficial damage. IPL uses non-coherent polychromatic light (500–1200 nm) to effectively target both melanin and hemoglobin. The minimal risk and virtually no downtime associated with this procedure have contributed to its success. A key IPL study by Bitter (31) showed that serial treatment with IPL visibly improved wrinkling, irregular pigmentation, skin coarseness, pore size, and telangictasias in more than 90% of patients. A newer technology that combines IPL with bipolar RF (electro-optical synergy or el s) was evaluated by Sadick et al. (32) and found to be as efficacious for pigmentation and vascularity but potentially more advantageous for pore size, superficial rhytids, and texture. This difference was caused by the addition of RF, which can penetrate more deeply into the dermis and stimulate collagen remodeling.

Other modalities used for photorejuvenation are the pulsed dye laser (PDT 585 nm) and the potassium titanyl phosphate (KTP 532 nm) laser. Both wavelengths effectively target oxyhemoglobin and melanin making them effective at treating red and brown discoloraiton. In a controlled, split face study, Hsu et al. (33) investigated PDT for the treatment of rhytids and reported improvements of surface topography of 9.8% (one treatment) and 15% (two treatments) supported by histologic evidence of collagen remodeling.

COMMON SERVICES

Cellulite Reduction

Treatment of cellulite can be divided into four main categories: attenuation of aggravating factors, physical and mechanical methods, pharmacologic agents, and laser treatments. Many technologies employed today attempt to improve lymphatic circulation and drainage via negative pressure massage, increase connective tissue to remodel the epidermal–dermal interface, and reduce the size of adipose cells that herniate into the dermal layers. Popular approaches include the use of multi-modality devices to achieve the above aims.

The use of bipolar RF, infrared light, and vacuum massage is combined by the VelaShape system (Syneron, Yokneam, Israel). Studies with device have demonstrated the improvement of surface texture, skin tightening as well reduction of circumference of thighs or abdomen (34,35). Other devices that claim to reduce the appearance of cellulite are TriActive (Cynosure, Westford, Massachusetts, USA), a combination of diode laser and massage and SmoothShapes (Eleme Medical, Merrimack, New Hampshire, USA.), a dual wavelength laser with vacuum massage. Recent studies have introduced extracorporeal pulse activation therapy (EPAT) to improve skin elasticity in cellulite. EPAT aims to induce tissue damage through the delivery of high-pressure acoustic energy; this process is followed by dermal remodeling involving recruitment of chemical mediators and neocollagenesis (36).

Overall the devices for cellulite reduction require multiple treatments (8–16) and ongoing maintenance treatments to maintain effect. The results can be modest with some improvement in contour, reduction of rippling, and slight circumferential reduction. Patients need to be properly informed about procedure timing and maintenance as well as realistic expectations to successfully incorporate this procedure into an aesthetic practice.

Tissue Tightening

Tissue tightening has been a major force in the aesthetic marketplace since the FDA approval of the first non-invasive treatment for rhytids in 2002. The promise to lift and firm the tissues of the face and body without surgery is an important component of nonsurgical aesthetic rejuvenation. With increasing desire on behalf of the cosmetic consumer for earlier and effective nonsurgical intervention, this sector of aesthetics will see prolific growth and development to become a core aesthetic offering in the near future.

Monopolar RF devices designed to uniformly heat the dermis utilizing the tissue's inherent resistance to current flow initiated the field of tissue tightening. This technology facilitated the creation of thermal zones within the dermis while leaving the epidermis undamaged. Results were associated with a wound-healing response by way of recruitment of heat-shock proteins and inflammatory mediators such as TNF-α, IL-β, and TGF-β (37). Histologic analysis revealed new collagen deposition at 10 weeks post-treatment characterized by increased cellularity and hyaluronic deposits (37–39). Early results with RF were promising but inconsistent and shortcomings led to the development of combination therapy using electrical and optical energies. Today the device offerings have extended to monopolar and bipolar RF, broadband infrared light, bipolar RF with broadband light, and ultrasound.

Monopolar RF continues to maintain dominance in this aesthetic indication with the ThermaCool (Thermage, Inc., Hayward, California, USA) being the pacesetter. Thermage has expanded its arsenal of heating tips and products to treat the delicate thinner skin areas of the eyelids and hands, as well originate tips with deeper penetration for targeting the subcutaneous layer and treating the abdomen, flanks, thighs, buttock, and arms. Off-face applications of tissue tightening technologies are commonly employed for post-partum abdomen and laxity after sudden weight loss as well as an adjunct to liposuction.

Ultrasound is an emerging modality for tissue tightening. Ultrasound delivers heat to the dermis through the absorption of acoustic energy and the cellular response is thermal damage and subsequent recruitment of specific cytokines and inflammatory mediators similar to RF (40). The Ulthera system (Ulthera, Mesa, Arizona, USA) received FDA clearance for non-invasive tissue tightening in 2009. A study by Alam et al. (41) of patients treated with a single pass at 4.5 mm focal depth and energies of 0.4 to 1.2 J demonstrated at least 0.5 cm improvement in brow elevation in 89% of evaluated subjects.

Laser Resurfacing

Laser technology is a rapidly growing area of skin rejuvenation and aesthetic improvement. Through different mechanisms, all laser therapies utilize thermal energy to reform and homogenize connective tissue. Initially there is a localized coagulation of collagen fibers for 14 days post-treatment, and this process is followed by new connective tissue synthesis from the thermally altered matrix (42). Histologically fibroblasts may be observed migrating to the affected regions and initiating new collagen formation (43). The entire process is mediated various inflammatory cytokines and culminates in increased elasticity and improved aesthetic appearance of the skin (44).

Laser resurfacing began with the ablative devices (CO_2 and erbium:YAG) that completely eliminate the epidermis and the upper layers of the dermis, inducing the formation of a wound. This lesion subsequently reconstitutes an epithelium in approximately 7 to 14 days (45). Although ablative treatment demonstrated unparalleled effectiveness in ability treat sun-induced skin damage, it was associated with significant side effects including delayed erythema and edema, pigmentation abnormalities, significant scarring, and increased risk of infection (46,47). Furthermore, the reepithelization period constituted significant downtime.

These challenges lead to the emergence of fractional lasers. Fractional photothermolysis (FP) produces distinct lesions of thermal damage surrounded by larger zones of undisturbed normal skin (48). The combination of lesions and adjacent viable tissue allows for complete reepithelization within 24 to 48 hours and creates an annular configuration of thermal coagulation which enhances tissue tightening because collagen shortening is a three-dimensional mechanism (49,50). The stratum corneum remains undamaged, which greatly reduces the risk of developing an infection and serves to function in exfoliating underlying coagulated tissue, referred to as microepidermal necrotic debris (MEND) (48). Complete regeneration and full clinical benefits of using FP takes approximately three months.

The emergence of fractional resurfacing or FP has significantly advanced laser therapy. The potential therapeutic benefits of this revolutionary technology device are only beginning to unravel and many more devices and applications are expected in the near future.

Injection Lipolysis

Injection lipolysis, also sometimes referred to as mesotherapy, denotes the intradermal injection of multiple chemical substances and lipolytic agents for the purposes of circumferential reduction. The active ingredient appears to be deoxycholate, a detergent that saponifies fat and leads to fat's absorption by the body. Most of the time the injection cocktail is formulated as a phosphotidylcholine/deoxycholate mixture in various proportions. The mixture is then injected—during multiple sessions—in the target area for fat reduction. While very popular, especially in Europe and South America, this technique is not standardized with most practitioners employing a proprietary mixture to which vitamins and other agents are added. A heavy criticism of this procedure has been a paucity of controlled, double-blind clinical trials supporting the results. This technique is not FDA approved and is performed by practitioners with great variability in experience and education making it a risky course of action without researching the provider.

CONCLUSION

In recent years, much progress has been made in technological approaches for aesthetic indications. At the same time, the desire for holistic aesthetic care on behalf of the consumer has driven the emergence of medical spas and aesthetic medical centers offering primary services administered or closely supervised by a physician. Core services such as microdermabrasion, medical facials, photorejuvenation, laser hair removal, and injectables are fixtures at most medical spas, with cellulite reduction, tissue tightening and laser resurfacing becoming increasingly common.

The growing demand for safer devices with less downtime as well as less invasive and nonsurgical approaches has led to the development of some innovative therapies. In particular novel devices able to induce thermal damage while sparring the epidermis, either for laser resurfacing or tissue tightening indications, as well as advanced injectables are posed to lead the way in nonsurgical and age-prophylactic aesthetic indications. The trend toward non-invasive approaches assures that further advances in science and technology will serve to create superior services for the aesthetic marketplace.

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3 Aesthetic marketplace economics: Trends and performance of the top performing aesthetic medical procedures

Page S. Piland

The year 2008 marked the beginning of a challenging economic time for many aesthetic medical practices in respect of productivity and income. These economic challenges continued through 2009 and are still persistent at the time of this publication.

During this challenging economic time, many practices were forced to reevaluate their strategies and make modifications to existing business plans. A major part of this process involved identifying underperforming areas and refocusing marketing activities. Frequently, this led to a shift from large surgical procedures to smaller nonsurgical procedures. This was not a welcome shift for surgeons, but many recognized the need to make a change for the short term.

Many physicians initially believed that patients were deferring higher priced surgical procedures until the economy improved. Many patients opted to have nonsurgical procedures performed in the interim. These lower priced nonsurgical alternatives were viewed as a way to meet present patient demand. It also represents a way for the practice to remain engaged with its patient base and generate revenue. Cosmeceutical sales are also viewed in a similar manner and can help retain a patient's bonds with a practice.

OBJECTIVE ECONOMIC DATA: PARSING THE ASAPS COSMETIC SURGERY NATIONAL DATA BANK STATISTICS

All the data in this section have been gathered by the American Society for Aesthetic Plastic Surgery (ASAPS). ASAPS has conducted a multispecialty survey for 12 years in order to collect this information. These data are useful in analyzing the aesthetic market and measuring individual practice performance.

Methodology

A paper-based questionnaire was mailed to 16,000 board-certified physicians (6000 dermatologists, 6000 otolaryngologists, and 4000 plastic surgeons). A total of 894 completed and valid responses (461 plastic surgeons, 277 dermatologists, and 156 otolaryngologists) were received.

Final figures have been projected to reflect nationwide statistics and are based exclusively on the board-certified plastic surgeons, otolaryngologists, and dermatologists. The findings have been aggregated and extrapolated to the known population of 23,600 physicians who are board certified in these specialties. Though the confidence intervals change by procedure, depending on the grouping's sample size and the response variance, the overall survey portion of this research has a standard error of ±3.21% at a 95% level of confidence.

The *Survey on Cosmetic Procedures Performed in 2008* was compiled, tabulated, and analyzed by Industry Insights, Inc. (www.industryinsights.com), an independent research firm based in Columbus, Ohio.

Market Overview and Assessment

There were 10,258,556 surgical and nonsurgical procedures performed in 2008. The 2008 market performance was down by 12.33% or 1,442,478 procedures compared to the number of procedures in 2007 which was 11,701,031. This reduction in the number of procedures resulted in a revenue loss of $1.37 billion.

To help put this number into perspective and demonstrate the growth of the market over the last 10 years, it is important to recognize that the 2008 market loss represents half of the entire market just 10 years previously. In the 1998 market, 2,772,924 procedures were performed. In the years since that time, there have been only two other market declines. The first was in 2002 with a loss of 18.66% and the second in 2005 with a loss of 3.6% of the total market volume over the previous year.

With the exceptions of 2002 and 2005, the years between1998 and 2004 were years of exceptional growth ranging from a low of 19.78% in 2003 to the peak performing year 1999 which experienced 66.14% growth.

Since 1997 there has been over a 162% increase in the total number of cosmetic procedures performed. Nonsurgical procedures have led in the percentage growth category, coming in at over 233%, while surgical procedures have grown by almost 80% since 1997.

In 2008, women accounted for almost 92% of the procedures. The age of patients with the highest number of cosmetic procedures in 2008 ranged between 35 and 50 years, representing 44.6% of the total market volume.

Breaking Down the Economics of Surgical and Nonsurgical Procedures[a]

In order to organize the data for increased comprehension and ease of use, the top five surgical and the top five nonsurgical procedures will be reviewed and analyzed (Fig. 3.1A and B). The complete data set is available at the ASAPS website: http://www.surgery.org/.

Surgical Procedures: The Top Five Surgical Procedures

The top five surgical procedures are ranked by total expenditure or revenue generated (Fig. 3.2A and B).

Figures are for physician/surgeon fees only and do not include fees for the surgical facility, anesthesia, medical tests, prescriptions, surgical garments, or other miscellaneous costs related to surgery. Figures for procedures often performed on more than one site in the same session reflect typical fees for one site.

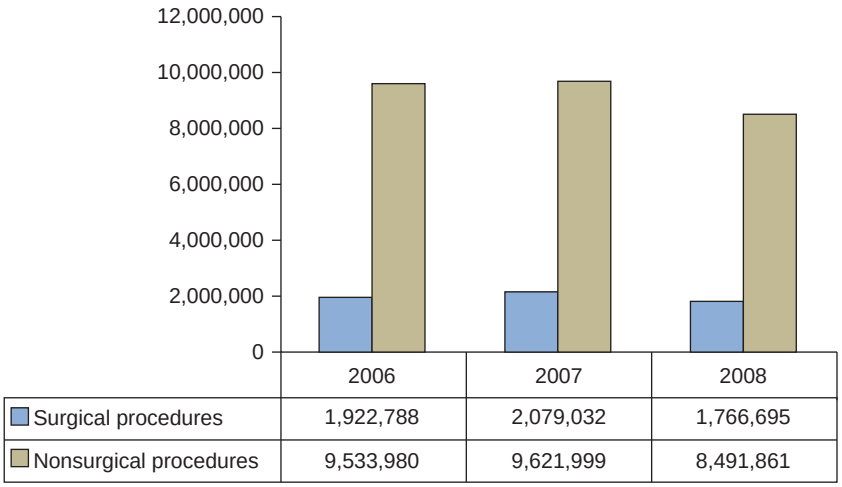
Breast Augmentation[b]

Breast augmentation held the first position among the cosmetic surgery procedures in the years 2006, 2007, and 2008. This procedure accounted for 11.3% of the total revenue generated in 2008 within the aesthetic market (Fig. 3.3). It generated $1,327,566,071 in revenue, which was down from 2007 by 13.6% or $208,925,578. The national average physician/surgeon fee per surgery in 2008 was $3744, which was a decrease by $144 per surgery (Fig. 3.4).

This procedure was performed 355,671 times in 2008, which was a decrease of 10.96% resulting in 43,769 fewer surgeries. The average number of breast augmentations in 2008 per ASAPS member was 62.6, resulting in 15.5 fewer procedures.

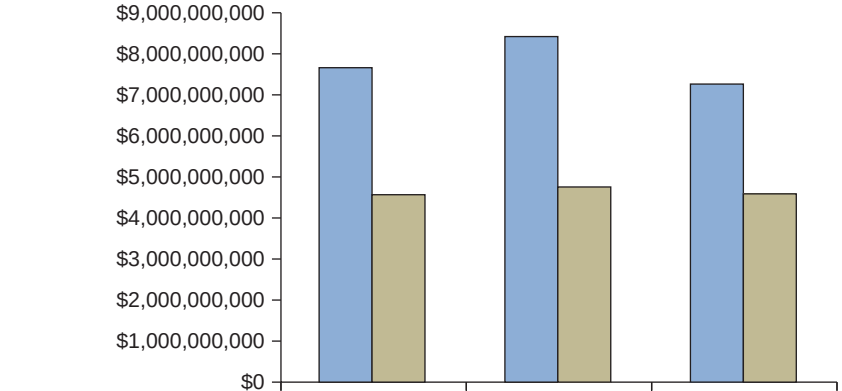
Silicone Gel Vs. Saline Implants. Saline implants were the first choice of implant 52% of the time in 2008. The use of silicone gel implants continued to increase obtaining a 48% market share. For the last 3 years, saline implant usage has decreased significantly while silicone gel implants demonstrated a consistent growth.

[a] The American Society for Aesthetic Plastic Surgery.
[b] The American Society for Aesthetic Plastic Surgery.



	2006	2007	2008
Surgical procedures	1,922,788	2,079,032	1,766,695
Nonsurgical procedures	9,533,980	9,621,999	8,491,861

(**A**)



	2006	2007	2008
Surgical procedures	$7,632,270,642	$8,395,851,754	$7,222,233,062
Nonsurgical procedures	$4,542,014,327	$4,752,340,323	$4,559,075,462

(**B**)

Figure 3.1 Market volume for surgical vs. nonsurgical procedures: (**A**) total number of procedures; (**B**) total expenditure. *Source*: The American Society for Aesthetic Plastic Surgery.

The national average physician/surgeon fee per procedure for silicone gel implants in 2008 was $3885 and $3603 for saline implants. Silicone gel implants generated $637,177,252 and saline implants generated $690,338,819 in revenue.

Lipoplasty[c]

Lipoplasty was the second among the top five cosmetic surgery procedures in 2008. This procedure accounted for 8.43% of the total revenue generated in 2008 within the aesthetic market (Fig. 3.5). It generated $984,028,900 in revenue, which was down from 2007 by 26.45% or $353,867,291. The national average physician/surgeon fee per surgery in 2008 was $2903, which was a decrease of $38 per surgery (Fig. 3.6).

This procedure was performed 341,144 times in 2008, which was a decrease of 25.32%, resulting in the largest procedure decline in 2008 of 115,684 fewer surgeries. The average number of procedures in 2008 per ASAPS member was 55.1, resulting in 17 fewer procedures.

Suction-assisted Vs. Ultrasound-assisted Lipoplasty. Suction-assisted lipoplasty was still the first choice 81.7% of the time in 2008. Ultrasound-assisted lipoplasty lost market share from 20.4% in 2007 to 18.3% in 2008. For the last 3 years, suction-assisted lipoplasty has been the first choice by a significant margin.

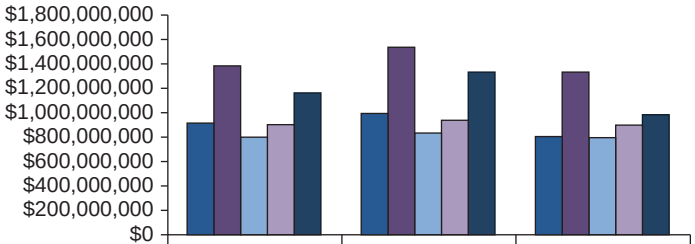
The national average physician/surgeon fee per procedure for suction-assisted lipoplasty in 2008 was $2874 and $2933 for ultrasound-assisted lipoplasty. Suction-assisted lipoplasty generated $804,268,214 and ultrasound-assisted lipoplasty generated $179,760,686 in revenue.

Facelift[d]

Facelift was the third among the top five cosmetic surgery procedures in 2008. This procedure accounted for 7.6% of the total revenue generated in 2008 within the aesthetic market. It generated $891,524,394 in revenue, which was down from 2007 by 4.99% or $46,807,663. The national average physician/surgeon fee per surgery in 2008 was the highest fee for a surgery or procedure at $6728. This was a decrease of $64 per surgery.

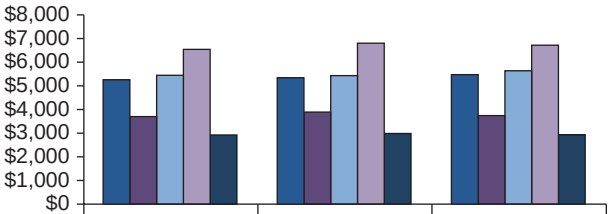
[c] The American Society for Aesthetic Plastic Surgery.

[d] The American Society for Aesthetic Plastic Surgery.



	2006	2007	2008
Abdominoplasty	$907,651,429	$991,544,589	$806,185,765
Breast augmentation	$1,379,731,684	$1,536,491,649	$1,327,566,071
Breast reduction	$791,678,946	$829,274,709	$787,844,501
Facelift	$903,002,712	$938,332,057	$891,524,394
Lipoplasty	$1,162,407,264	$1,337,896,191	$984,028,900

(**A**)



	2006	2007	2008
Abdominoplasty	$5,263	$5,350	$5,470
Breast augmentation	$3,678	$3,888	$3,744
Breast reduction	$5,429	$5,417	$5,630
Facelift	$6,532	$6,792	$6,728
Lipoplasty	$2,902	$2,941	$2,903

(**B**)

Figure 3.2 (**A**) Total expenditure or revenue generated per procedure and (**B**) national average for physician/surgeon fees per procedure for the top five surgical procedures. *Source*: The American Society for Aesthetic Plastic Surgery.

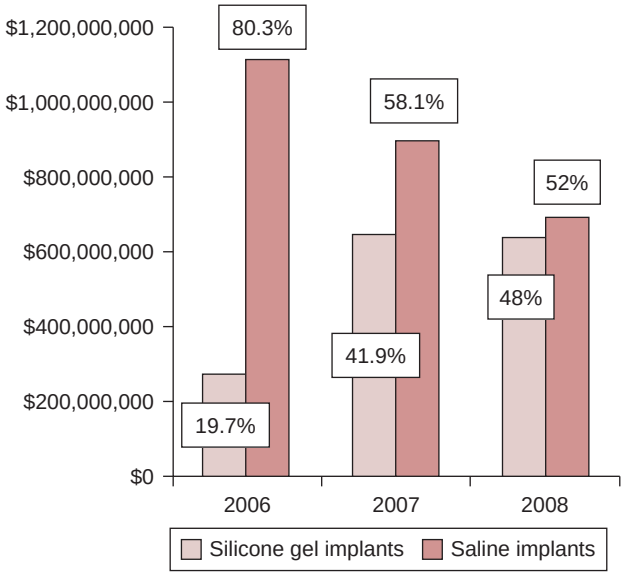


Figure 3.3 Total expenditures with percentage of market share for breast augmentation using silicone gel implants vs. saline implants. *Source*: The American Society for Aesthetic Plastic Surgery.

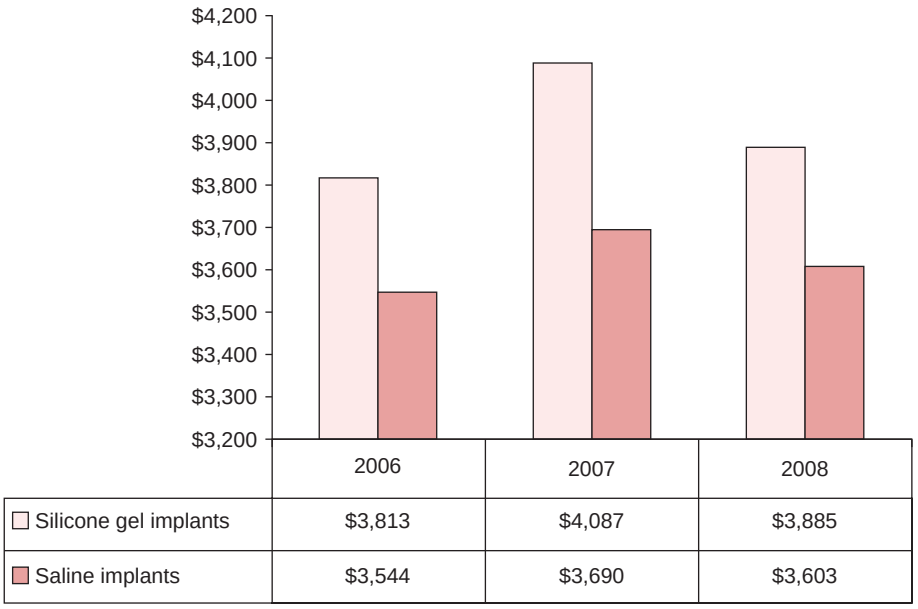
This procedure was performed 132,504 times in 2008, which was a decrease of 4.09%, resulting in the smallest procedure decline in 2008 of 5649 fewer surgeries. The average number of procedures in 2008 per ASAPS member was 16.1, resulting in 3.4 fewer procedures.

Abdominoplasty[e]

Abdominoplasty was the fourth among the top five cosmetic surgery procedures in 2008. This procedure accounted for 6.8% of the total revenue generated in 2008 within the aesthetic market. It generated $806,185,765 in revenue, which was down from 2007 by 18.69% or $185,358,824. The national average physician/surgeon fee per surgery in 2008 was $5470, which was one of only two surgery fee increases in 2008. This was an increase of $120 per surgery.

This procedure was performed 147,392 times in 2008, which was a decrease of 20.47%, resulting in the second highest surgical procedure percentage decrease in 2008. There were 37,943 fewer surgeries in 2008. The average number of procedures in 2008 per ASAPS member was 22, resulting in 8.3 fewer procedures per ASAPS member.

[e] The American Society for Aesthetic Plastic Surgery.



	2006	2007	2008
Silicone gel implants	$3,813	$4,087	$3,885
Saline implants	$3,544	$3,690	$3,603

Figure 3.4 National average for physician/surgeon fees per procedure for breast augmentation using silicone gel implants vs. saline implants. *Source*: The American Society for Aesthetic Plastic Surgery.

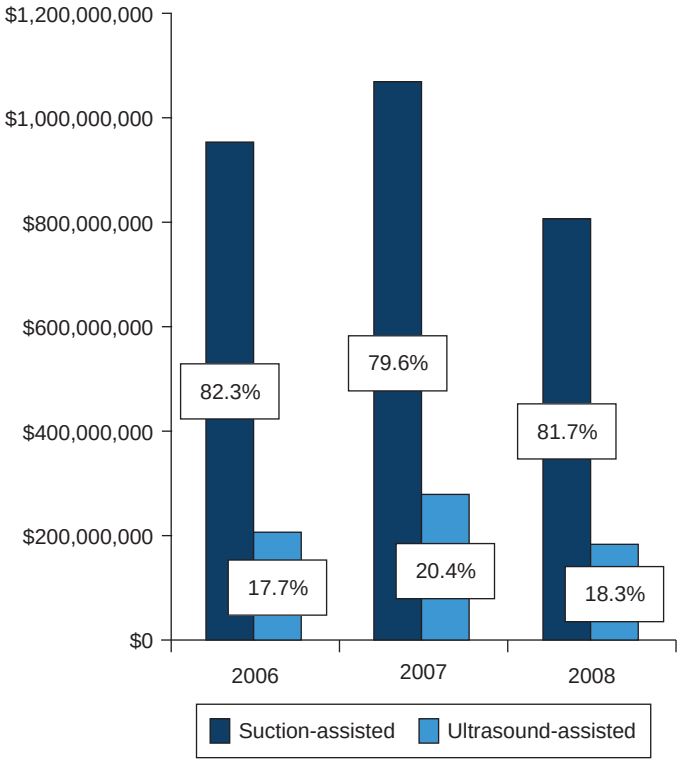


Figure 3.5 Total expenditures for suction-assisted vs. ultrasound-assisted lipoplasty. *Source*: The American Society for Aesthetic Plastic Surgery.

Breast Reduction (Women)

Breast reduction for women was the fifth among the top five cosmetic surgery procedures in 2008. This procedure accounted for 6.7% of the total revenue generated in 2008 within the aesthetic market. It generated $787,844,501 in revenue, which was down from 2007 by 5% or $41,430,208. The national average physician/surgeon fee per surgery in 2008 was $5630, which was the highest increase in surgery fees in 2008. This was an increase of $213 per surgery.

This procedure was performed 139,926 times in 2008, which was a decrease of 8.60%. There were 13,161 fewer surgeries in 2008. The average number of procedures in 2008 per ASAPS member was 16.6, resulting in 3.8 fewer procedures per ASAPS member.

Nonsurgical Procedures: The Top Five Nonsurgical Procedures

The top five nonsurgical procedures are ranked by total expenditure or revenue generated (Fig. 3.7A and B).

Botox[f]

Botox held the first position among nonsurgical cosmetic surgery procedures in the years 2006, 2007, and 2008. This procedure accounted for 9.3% of the total revenue generated in 2008 within the aesthetic market. It generated $1,090,374,483 in revenue, which was up from 2007 by 3.4% or $35,807,747. The national average physician/surgeon fee per procedure for Botox in 2008 was $443, which was an increase of $63 per procedure.

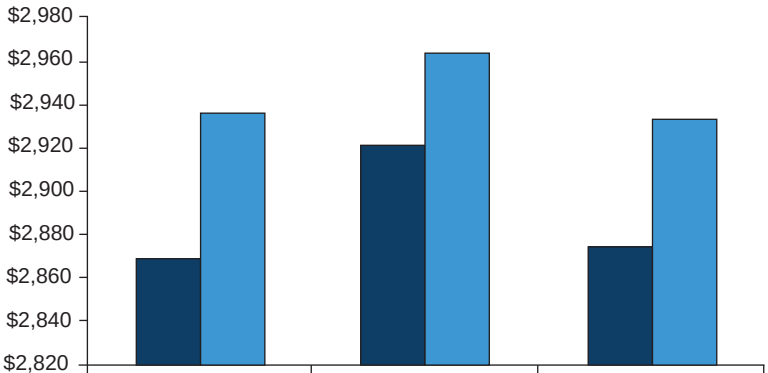
This procedure was performed 2,464,123 times in 2008, which was a decrease of 11.21%, resulting in 311,053 fewer procedures. The average number of procedures in 2008 per ASAPS member was the highest at 222.5, accounting for 24% of the market. The procedure decrease resulted in 129.9 fewer procedures performed per ASAPS member.

Laser Skin Resurfacing

Laser skin resurfacing was the second among the top five nonsurgical cosmetic procedures in 2008. This procedure accounted for 6.4% of the total revenue generated in 2008 within the aesthetic market (Fig. 3.8). It generated $751,926,177 in revenue, which was up from 2007 by 70.94% and was the highest growth percentage of all surgeries and procedures on this list. Laser skin resurfacing grew by $312,039,521 over 2007. The national average physician/surgeon fee per surgery in 2008 was $1619, which was an increase of $120 per procedure (Fig. 3.9).

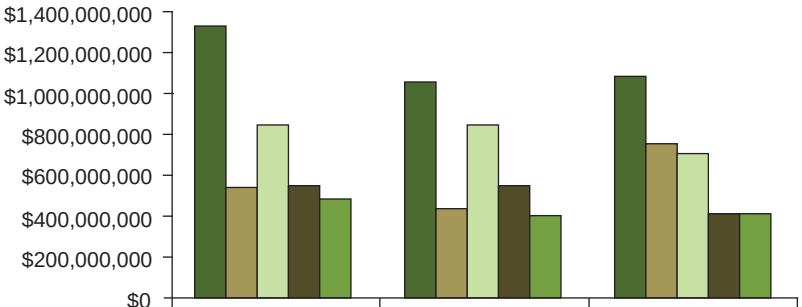
This procedure was performed 570,880 times in 2008. This was the largest procedure percentage increase at 11.96% in 2008, resulting in 60,979 more procedures. The average number of procedures in 2008 per ASAPS member was 20.1, resulting in 2.1 more procedures.

[f] The American Society for Aesthetic Plastic Surgery.



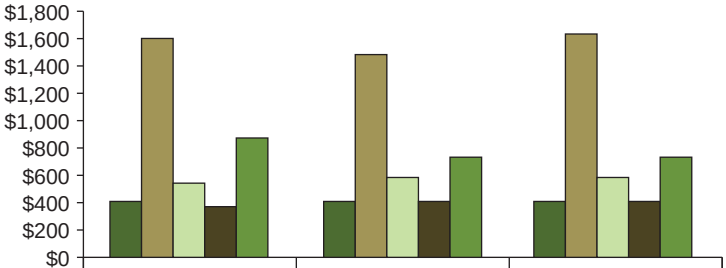
	2006	2007	2008
Suction-assisted	$2,868	$2,920	$2,874
Ultrasound-assisted	$2,936	$2,963	$2,933

Figure 3.6 National average for physician/surgeon fees per procedure for suction-assisted vs. ultrasound-assisted lipoplasty. *Source*: The American Society for Aesthetic Plastic Surgery.



	2006	2007	2008
Botox	$1,326,367,287	$1,054,566,736	$1,090,374,483
Laser skin resurfacing	$546,256,262	$439,886,656	$751,926,177
Hyaluronic acid	$848,191,987	$834,460,585	$714,165,690
Laser hair removal	$550,344,982	$546,698,426	$417,299,496
Chemical peel	$485,958,315	$412,907,539	$416,573,762

(**A**)



	2006	2007	2008
Botox	$417	$380	$443
Laser skin resurfacing	$1,593	$1,499	$1,619
Hyaluronic acid	$532	$576	$566
Laser hair removal	$373	$387	$326
Chemical peel	$870	$718	$704

(**B**)

Figure 3.7 (**A**) Total expenditure or revenue generated per procedure and (**B**) national average for physician/surgeon fees per procedure for the top five nonsurgical procedures. *Source*: The American Society for Aesthetic Plastic Surgery.

Ablative Vs. Nonablative Resurfacing. Nonablative resurfacing was still the first choice 71.2% of the time in 2008. Ablative resurfacing lost market share from 43.1% in 2007 to 28.8% in 2008.

The national average physician/surgeon fee per procedure for nonablative resurfacing in 2008 increased by $565 to $1145. Ablative resurfacing decreased by $324 to $2094 in 2008. Nonablative resurfacing generated $535,467,810 and ablative resurfacing generated $216,458,367 in revenue.

Hyaluronic Acid (Injectible)[g]

Injectible hyaluronic acid was the third among the top five nonsurgical cosmetic surgery procedures in 2008. This procedure accounted for 6.1% of the total revenue generated in 2008 within the aesthetic market. It generated $714,165,690 in revenue, which was down from 2007 by14.42% or $120,294,895. The national average physician/surgeon fee per procedure in 2008 was $566, which was a decrease of $10 per procedure.

This procedure was performed 1,262,848 times in 2008, which was a decrease of 12.83%, resulting in 185,868 fewer procedures. The average number of procedures in 2008 per ASAPS member was 81.5, resulting in 26.5 fewer procedures performed per ASAPS member.

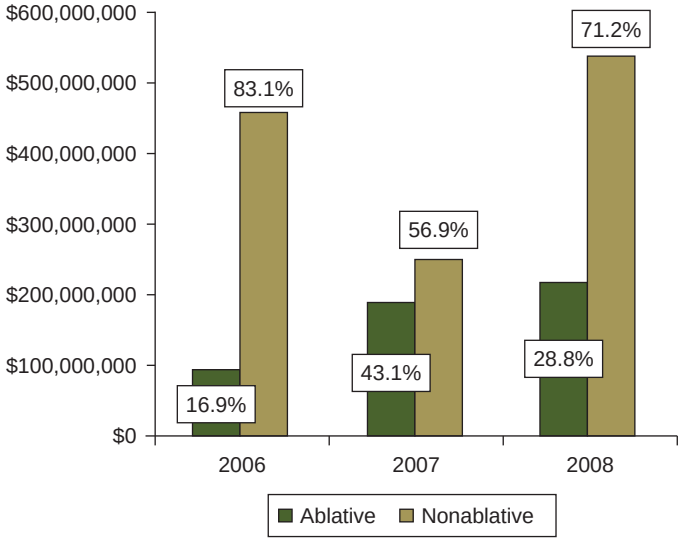


Figure 3.8 Total expenditures with percentage of market share for ablative vs. nonablative laser skin resurfacing.

Laser Hair Removal[h]

Laser hair removal was the fourth among the top five nonsurgical cosmetic surgery procedures in 2008. This procedure accounted for 3.5% of the total revenue generated in 2008 within the aesthetic market. It generated $417,299,496 in revenue, which was down from 2007 by23.67% or $129,398,930. The national average physician/surgeon fee per procedure in 2008 was $326, which was a decrease of $61 per procedure.

This procedure was performed 1,280,964 times in 2008, which was a decrease of 9.32%, resulting in 131,693 fewer procedures. The average number of procedures in 2008 per ASAPS member was 90.4, resulting in 38.7 fewer procedures performed per ASAPS member.

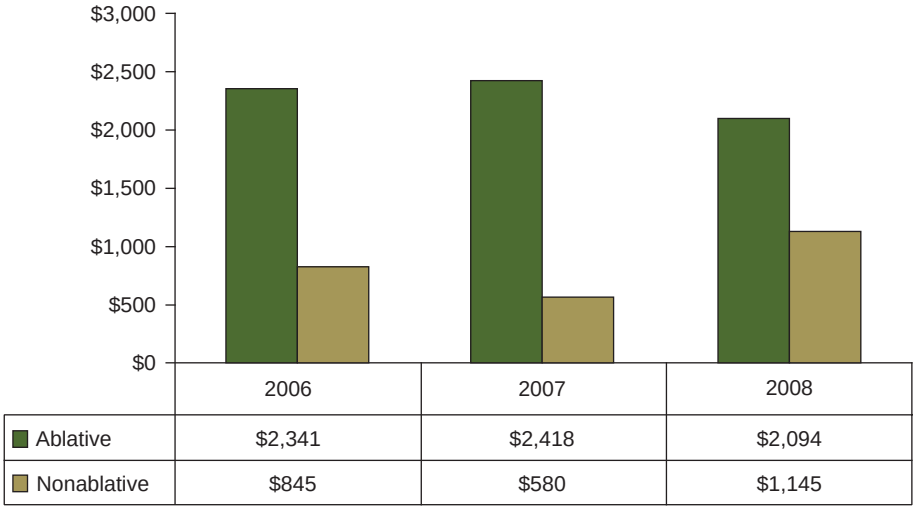
Chemical Peel

Chemical peels were the fifth among the top five nonsurgical cosmetic surgery procedures in 2008. This procedure accounted for 3.5% of the total revenue generated in 2008 within the aesthetic market. It generated $416,573,762 in revenue, which was up from 2007 by 0.89% or $3,666,223. The national average physician/surgeon fee per procedure in 2008 was $704, which was a decrease of $14 per procedure.

This procedure was performed 591,808 times in 2008, which was an increase of 2.91%, resulting in 16,728 more procedures. The average number of procedures in 2008 per ASAPS member was 39.7, resulting in 3.5 more procedures performed per ASAPS member.

CONCLUSION

The economics of the aesthetic marketplace have grown and contracted dramatically over the past few years. Some of this growth is due to the fact that the procedures have gotten so much better than the ones that preceded them. Contractions in the aesthetic marketplace have typically been due to economic downturns or from news-related blips. During contractions, practices that have coherent marketing plans can alter their strategies and try to convert to less invasive, less expensive procedures. During periods of expansion, practices that can scale with the growth have an opportunity to grow. During either, it is essential to have an understanding of economics as it pertains to an aesthetic practice.

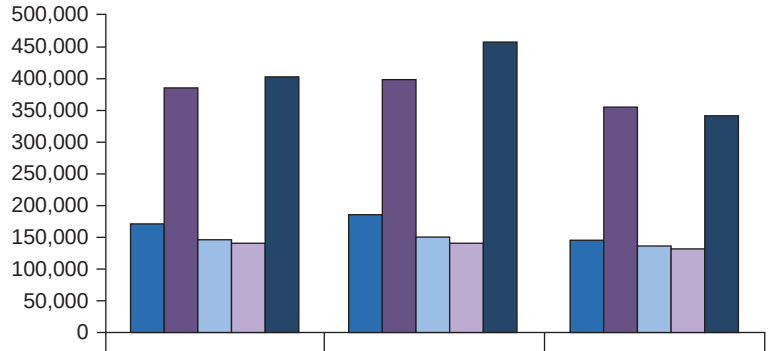


	2006	2007	2008
Ablative	$2,341	$2,418	$2,094
Nonablative	$845	$580	$1,145

Figure 3.9 National average for physician/surgeon fees per procedure for ablative vs. nonablative laser skin resurfacing.

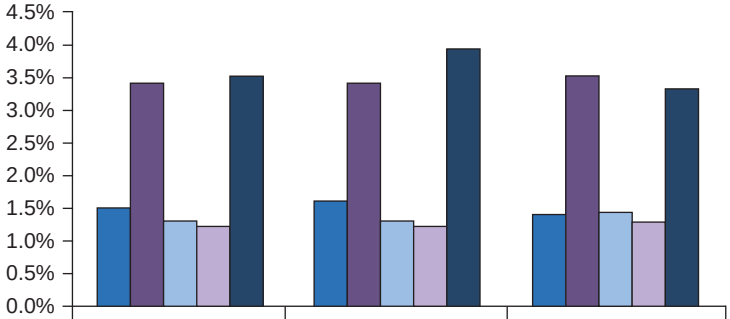
[g] The American Society for Aesthetic Plastic Surgery.
[h] The American Society for Aesthetic Plastic Surgery.

APPENDIX



	2006	2007	2008
Abdominoplasty	172,457	185,335	147,392
Breast augmentation	383,886	399,440	355,671
Breast reduction	145,822	153,087	139,926
Facelift	138,245	138,153	132,504
Lipoplasty	403,684	456,828	341,144

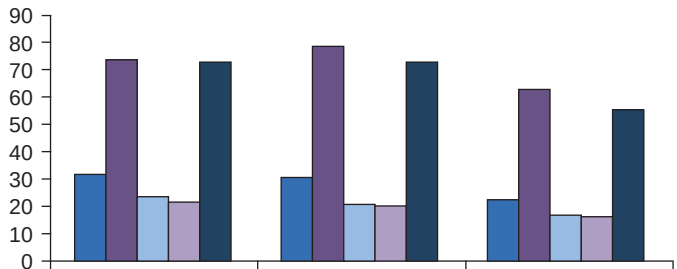
(**A**)



	2006	2007	2008
Abdominoplasty	1.5%	1.6%	1.4%
Breast augmentation	3.4%	3.4%	3.5%
Breast reduction	1.3%	1.3%	1.4%
Facelift	1.2%	1.2%	1.3%
Lipoplasty	3.5%	3.9%	3.3%

(**B**)

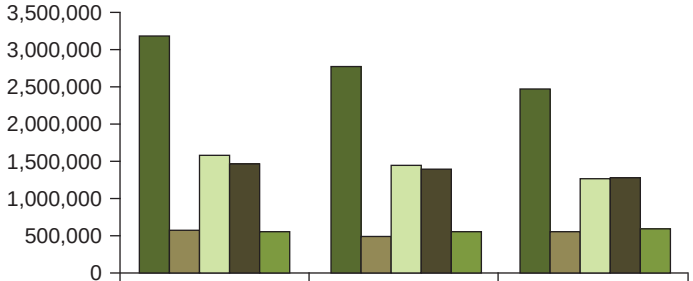
Figure 3.A1 (**A**) Number of procedures, (**B**) percentage of total procedures. (*Continued*)



	2006	2007	2008
Abdominoplasty	31	30.3	22
Breast augmentation	73	78.1	62.6
Breast reduction	23	20.4	16.6
Facelift	20.7	19.5	16.1
Lipoplasty	72.7	72.1	55.1

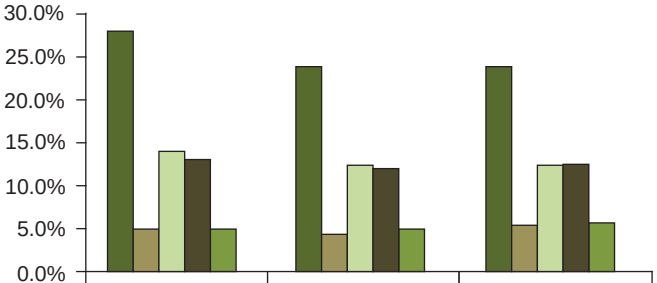
(**C**)

Figure 3.A1 (*Continued*) (**C**) Average number of procedure per ASAPS member for the top five surgical procedures. *Source*: The American Society for Aesthetic Plastic Surgery.



	2006	2007	2008
Botox	3,181,592	2,775,176	2,464,123
Laser skin resurfacing	576,509	509,901	570,880
Hyaluronic acid	1,593,554	1,448,716	1,262,848
Laser hair removal	1,475,296	1,412,657	1,280,964
Chemical peel	558,432	575,080	591,808

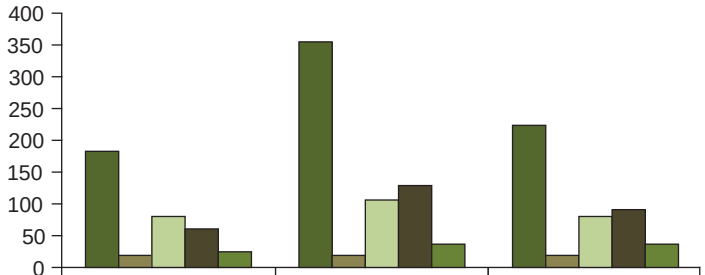
(**A**)



	2006	2007	2008
Botox	27.8%	23.7%	24.0%
Laser skin resurfacing	5.0%	4.4%	5.6%
Hyaluronic acid	13.9%	12.4%	12.3%
Laser hair removal	12.9%	12.1%	12.5%
Chemical peel	4.9%	4.9%	5.8%

(**B**)

Figure 3.A2 (**A**) Number of procedures, (**B**) percentage of total procedures. (*Continued*)



	2006	2007	2008
Botox	183.1	352.4	222.5
Laser skin resurfacing	17.4	18	20.1
Hyaluronic acid	78.3	108	81.5
Laser hair removal	62.8	129.1	90.4
Chemical peel	25.5	36.2	39.7

(**C**)

Figure 3.A2 (*Continued*) (**C**) Average number of procedure per ASAPS member for the top five nonsurgical procedures. *Source*: The American Society for Aesthetic Plastic Surgery.

4 Photography for the aesthetic patient

Holly P. Smith

Photography serves a multitude of purposes in medicine; research, medical–legal reasons, comparative studies, and publication as well as for marketing purposes. All of these reasons depend on accurate photographic documentation.

The majority of physicians and office staff are not properly trained in existing photographic standards for good patient photography. It is important to implement these standards into your practice because aesthetics is all about aesthetics. It is about being able to visually show an aesthetic improvement and if your photography is not good, it can often depict inaccurate results or more often, no results at all.

In a cosmetic or aesthetic practice, the practice of photography can be extremely beneficial especially for communicating what your goals are to your patient. This can be performed through simulated imaging and pre-operative/treatment analysis of your patients' photographs. Providing photography in your practice is providing a service to your patients. It is one of the most valuable tools that can assist your practice in many ways. For example, photographing your patient's result throughout different time intervals can reinforce your patient's perception of treatment success, which leads them to experience a greater level of satisfaction with your products and services. Another example is by providing samples of your work rather than using stock imagery. This helps gain trust with your patients by showing them that you get results. You can explain a procedure or treatment process to a patient but nothing is going to compare to showing a patient the "before and after" photographic result of an outcome you performed.

Photography sets the foundation for how your work will be evaluated and presented. Setting high standards in photography and using existing protocols will ensure that your talent is properly represented.

PRINCIPLES OF PHOTOGRAPHY

Staff and physicians who may not have a background in photography perform most patients' photography. Knowing photographic basics will help improve patient photography when photographing in the operating room or clinical setting. The following are the fundamental principles of photography.

Aperture

Aperture refers to the size of the adjustable opening in the iris in a lens that determines the amount of light falling onto the film or sensor. The size of the opening is measured using an f-number or "f-stop" (f8, f11, etc.). Because f-numbers are fractions of the focal length, "higher" f-numbers represent smaller apertures (1). The smaller the aperture, the greater the depth of field. This means that if you use a smaller aperture, you will have the forefront, middle, and background in sharp focus. For patient photography, it is important to use a small aperture, as you want all areas to be in focus. An aperture between f11 and f22 is suitable for patient photography.

Shutter Speed

The shutter speed determines how long the iris of the camera is open exposing the film or sensor to light. For instance, a shutter speed of 1/125 s will expose the sensor for 1/125th of a second. Electronic shutters act in a similar way by switching on the light sensitive photodiodes of the sensor as long as requested by the shutter speed (2). For patient photography, it is important to use a shutter speed faster than 1/60. Anything under a 60th of a second can produce blurring if the patient or photography moves even slightly.

Depth of Field

Depth of field refers to the distance between the closest and farthest in-focus area of a photograph (also called the focal range). Depth of field is affected by the aperture, subject distance, focal length, and film or sensor format. The smaller the aperture, the greater the depth of field meaning that objects within a certain range behind or in front of the main focus point will appear sharp (3).

Focal Length

The focal length of a lens is defined as the distance in mm from the optical center of the lens to the focal point, which is located on the sensor or film. The focal length establishes the field of view. The longer the focal length the narrower and compressed the field of view becomes. The shorter the focal length, the larger the field of view becomes (4).

Camera lenses are categorized by normal, telephoto, and wide angle, according to the focal length and film size.

- *Normal*—When the focal length of a lens is in a range close to the diagonal measurement of the film/sensor's format, the lens is said to be "normal." For example, 43.27 mm is the exact distance of the diagonal of a 35 mm (35 × 24) film plane; therefore, the closest equivalent lens would be 50 mm. The 50 mm lens has a field of view of 46°.
- *Wide*—When the focal length is shorter than the film/sensor's diagonal; it's a "short" or wide-angle lens. For example, a 20 mm lens on a 35 mm (35 × 24) film plane would be considered a wide angle. The 20 mm lens has a field of view of 94°.
- *Telephoto*—When the focal length of a lens is longer than the film/sensor's diagonal; it's a "long" or telephoto lens. For example, a 105 mm lens on a 35 mm (35 × 24) film plane would be considered telephoto. The 105 mm lens has a field of view of 23°.

Single Lens Reflex (SLR)

It is a camera in which a system of mirrors shows the user the image precisely as the lens renders it. This is the recommended camera type to use for patient photography.

Through the Lens (TTL)

Refers to a metering system in which a light sensitive mechanism within the camera body measures exposure from the image light passing through the lens.

ISO

How sensitive the camera's sensor is to the amount of light falling on it. Raising the ISO of a camera makes the sensor more sensitive to light. This can be useful when photographing in low light situations where you don't want to use a flash. The disadvantage to raising your ISO is that you increase camera noise.

DIGITAL CAMERA MODES AND WHAT THEY REPRESENT

Digital cameras offer many shooting modes for photographing in various settings. Professional digital single lens reflex (DSLR) cameras primarily have the basic modes while prosumer or consumer digital cameras may

offer some of the basics but also include some predetermined settings that are represented by icons. Some of these modes may and may not be useful for patient photography. Below is a list of some of the basic modes and icons found on digital cameras and what they represent.

Aperture Priority
Aperture priority mode if generally represented by an AV or A depending on your camera. This is the preferred mode for photographing patients. This allows the user to choose the aperture and the camera selects the shutter speed to accommodate correct exposure. It is important to have a small aperture when photographing patients because you want all areas to be in focus-greater depth of field.

Shutter Priority Mode
Shutter priority mode is represented by TV or S. This mode allows users to choose the shutter speed. This mode would be important if you were trying to capture a fast moving object without blur, but it is typically not used in patient photography.

Manual Mode
Manual mode is represented by an M. Manual mode allows the user to choose both the shutter and aperture. This is the preferred method when photographing with studio lights in a clinical setting as it gives you complete control over the exposure of the scene.

Program Mode
Program mode is represented by a P. The program mode allows the user partial control over both the aperture and shutter. This mode is not necessary for patient photography.

Symbol of Person Running
This mode is typically used for fast moving subjects. It sets your shutter speed to a fast setting and raises your ISO. This mode is not necessary for patient photography.

Symbol of Mountains
Depending on your camera, this mode typically sets your aperture to the smallest setting possible given the available light, and can raise your ISO. Although it may seem unlikely, this mode can be used for capturing subjects in greater depth of field than in other modes.

Symbol of a Person's Profile
This mode represents portrait mode. Although it may seem like a good mode for capturing the face of a subject, it is not recommended to use this mode as it widens the aperture putting the background out of focus. For patient photography, it is best to use a small aperture so that all features are in focus.

Symbol of Flower (Macro Mode)
This mode represents macro mode. It is important to know about macro mode because it can be useful to use in some situations but it does have its disadvantages. With digital photography, the term largely refers to the camera's closest focusing distance. The macro mode generally has a flower icon. When this icon is chosen, it tells your camera that you want to focus on a subject closer to your lens (5). Typically the macro mode in patient photography is used when the camera needs to be 6 inches or less in distance to the subject being photographed. The disadvantage when photographing in macro mode for patient photography is that it typically tells your camera to use a large aperture, which decreases your depth of field.

WHAT TO LOOK FOR IN A DIGITAL CAMERA

There are many objectives to look for when shopping for a digital camera. One of them is the capability of the camera's zoom. There are typically two types: digital and optical zoom.

The digital zoom takes a part of the scene and interpolates data to fit on the CCD sensor plane. It mimics a greater zoom without actually gaining any additional image detail. It often results in a blurry and pixilated image.

The optical zoom changes the amount of the scene falling on to the CCD sensor. It is preferable to have an optical zoom because the information is not interpolated and can be enlarged and cropped with higher quality results (6). A 3× optical zoom will give you a focal length of 35 to 105 mm, which is the minimum necessary for photographing the face and body.

There are different types of viewfinders available on digital cameras. The viewfinder is the window you look through to compose the scene (7). The following are examples of the different types of viewfinders.

Optical Viewfinder on a Digital Compact Camera
The optical viewfinder on the digital compact camera is positioned above the camera lens so what you see through the optical viewfinder is different from what the lens projects onto the sensor. This type of sensor has parallax error, which can make framing inaccurate when photographing close-up.

Optical Viewfinder on a Digital SLR Camera (TTL)
The optical viewfinder of a digital SLR shows what the lens will project on the sensor via a mirror and a prism. It does not have parallax errors and shows information at the bottom of the LCD viewfinder that has a camera and exposure settings.

LCD on a Digital Compact Camera (TTL)
The LCD on a digital compact camera shows in real time what is projected onto the sensor by the lens. This is also called "through-the-lens" (TTL) viewing. The LCD does not have parallax errors but does shorten battery life and can be difficult to see LCD screen in bright sunlight conditions.

Electronic Viewfinder (EVF) on a Digital Compact Camera (TTL)
The electronic viewfinder shows in real time what is projected onto the sensor by the lens. It simulates in an electronic way the effect of the (superior) optical TTL viewfinders found on digital SLRs and doesn't suffer from parallax errors. EVF allows more accurate framing but can shorten the battery life.

Video Capability
Another important feature to look for when purchasing a digital camera is whether or not it has video capability. Many consumer cameras come with digital video capability but some do not. Having the capability to shoot digital video on your camera is useful for relaying important information between physicians, patients, and for media presentations.

Flash Options
There are many options for flash capability on digital cameras. If you are using studio lights with your digital camera, it is important that you purchase a digital SLR that has either a hot shoe or an external flash input connection on the camera. These types of connections allow the user more flash and remote flash synchronization options.

CONSIDER THE PATIENT

Your patient photography should be performed in a private location, even if it only consists of photographs of the face. Public areas such as open rooms or hallways should be avoided when photographing your patient. Many patients may feel intimidated and embarrassed about being photographed so ensuring privacy will make the experience