

A Review of Complications and Their Treatments in Facial Aesthetic Surgery

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Abstract

Aesthetic surgery has become increasingly popular in the last several decades, with facial aesthetic surgery accounting for a large percentage of the procedures performed. With this surge in popularity and the increase in the number of cosmetic surgeries and procedures completed, comes an inevitable increase in the number of complications encountered. This review elucidates common complications and effective management of frequently performed cosmetic facial surgeries. This article represents a general overview of the topic. For a more exhaustive review, the reader is encouraged to turn their attention to the facial plastics and additional surgical subspecialty literature. Aesthetic procedures discussed in this article include rhinoplasty, rhytidectomy, facial augmentation, otoplasty, brow lift, blepharoplasty, skin resurfacing and chemical peels, and facial injections.

Keywords

facial plastic surgery, cosmetic surgery, complications

Introduction

Facial aesthetic surgery accounts for approximately 60% of the most commonly performed aesthetic procedures.¹ The principal purpose of such surgery is to improve patient quality of life and satisfaction with physical appearance. With the increase in number of surgeries performed, comes a concomitant increase in the number of complications encountered. Managing complications of elective surgery poses a unique challenge for clinicians, as by nature such procedures are performed with the intention of improving a patient's appearance and not for the treatment of disease. The clinician therefore must treat the physical complication while also managing the patient's emotional response to negative outcome in an elective procedure.

Rhinoplasty

Rhinoplasty is one of the most commonly performed and technically difficult procedures in cosmetic surgery.² The nose is often considered the most prominent facial feature, and therefore its improvement in form and function can lead to significant psychological benefit.^{3,4} The incidence of rhinoplasty complications ranges from 8% to 15%.⁵⁻⁷ As with all facial aesthetic surgery, meticulous preoperative evaluation and surgical planning is invaluable in minimizing complications. As previously alluded to, complications of

rhinoplasty can be broken down broadly into functional and aesthetic issues, though they are not mutually exclusive. The underlying mechanisms behind complications are typically due to a combination of underresection, overresection, and/or asymmetry.

Aesthetic rhinoplasty complications can be thought of in terms of their anatomical locations. In the nasal tip, one of the most common complications is the infamous *pollybeak deformity*. This deformity is characterized by postoperative fullness in the supratip region and an abnormal tip-supratip association.⁸ The treatment for a *pollybeak* deformity depends on the underlying cause. If it is a result of scarring of the soft tissue envelope along the nasal dorsum, then steroid injection or skin taping should be attempted prior to discussion of surgical revision. However, if it is a result of underresection of the cartilaginous hump, further dorsal septal resection is indicated. If the underlying problem is

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overresection, the bony septum can be successfully augmented with a graft.³

Overreduction of the lower lateral cartilages may lead to tip ptosis and inadequate tip projection, by way of damage to the critical tip support mechanisms. This can lead to both cosmetic deformity and poor nasal function, including nasal valve collapse. This may in time lead to shrinkage of the soft tissue envelope and bossae formation. The use of intradomal stitches, columellar struts, as well as lateral crural strut grafts can help return structural support and tip projection. On the other hand, overresection of the caudal septum may cause excessive shortening of the nose by overrating the nasal tip. Placement of a caudal extension graft or a columellar strut may be of benefit in these cases.

One of the more commonly recognized deformities of the nasal vault after rhinoplasty is the saddle nose deformity. This occurs from overresection of the septum without preservation of a sufficient dorsal strut. Excessive dorsal hump resection is also a predisposing factor. Untreated septal hematoma, abscess, or postoperative trauma may also result in a saddle nose. The only true treatment for saddle nose deformity is onlay grafting, commonly with costal or auricular cartilage.⁹ The inverted-V deformity is characterized by visibility of the caudal edges of the nasal bones. This common complication occurs due to inadequate upper lateral cartilage support or insufficient in-fracture of the nasal bones. Care to reattach the upper lateral cartilages to the septum after hump reduction, as well as possible placement of spreader grafts, serves to reconstruct the midnasal vault.¹⁰

Other complications related to the bony nasal dorsum include the rocker deformity, the "open-roof" deformity, and greenstick fracture of the nasal bones. The rocker deformity occurs as a result of osteotomies being taken too far superiorly, which causes the nasal bone to "rock" laterally during in-fracture. This can be corrected by using a 2-mm osteotome to percutaneously create a more suitable superior fracture line.¹¹ Failure to perform lateral osteotomies, or performing insufficient osteotomies, after dorsal hump removal, leads to the "open-roof" deformity. This is managed by creating lateral osteotomies and in-fracture of the nasal bones. Greenstick fracture refers to the incomplete fracture of the nasal bones after osteotomy, leading to undertreatment of preoperative nasal deformity. Treatment requires repeat osteotomies with more aggressive fracture.

In addition to the complications listed above, rhinoplasty can also lead to side effects related to the skin and soft tissue. Infections are uncommon, but cellulitis is a potential risk that must be promptly recognized and treated with antibiotics. Many of the skin and soft tissue complications of rhinoplasty can be avoided by staying in the proper plane during dissection, as this preserves nasal blood supply and reduces the occurrence of postoperative edema. Proper taping of the soft tissue envelope at the end of surgery can minimize irregularities of skin. If noted in the early postoperative period, steroid injection may be used to reduce some irregular fullness. The

skin and soft tissue of the nose is extremely delicate, and it is unlikely that it can ever be fully repaired after significant damage. Skin complications occur at a higher rate with the use of alloplastic implants, and extrusion through the skin causes irreversible damage.³

Functional disturbance of the nose, most commonly represented by alteration in breathing, is one of the most common complications of rhinoplasty. In fact, studies suggest up to 10% of the patients complain of new or residual breathing complaints postoperatively.¹² One of the key tenets of preserving the nasal airway is conservatism and maintaining structural support. Overzealous resection can lead to atrophic rhinitis (empty nose syndrome), which can prove to be a life-altering problem for patients. Nasal obstruction can also occur as a consequence of excessive narrowing of the bony pyramid, as well as overresection of the lateral crus resulting in nasal valve collapse.¹³ Spreader grafts are frequently used in the treatment of internal nasal valve collapse, as well as alar batten grafts.¹⁴

Rhytidectomy

The most common complication of rhytidectomy is the development of a hematoma, which occurs in 2% to 15% of the patients.¹⁵ Significant hematomas that require a return to the operating room often present within the first 12 hours postoperatively. Those suffering from hypertension have a 2.6 times increased incidence of hematoma development; therefore, control of blood pressure during and after surgery is tantamount.¹⁶ Patients taking medications that contain aspirin, nonsteroidal anti-inflammatory drugs, or vitamin E are also at greater risk of postoperative hematoma.¹⁷ Patients are asked to stop taking these medications 2 weeks prior, and at least 1 week after surgery if permitted by the prescribing physician. Minor hematomas, which are common in the first postoperative week, can be evacuated via needle aspiration or by making a small opening in the incision line to evacuate clots. It is important to recognize the occurrence of hematomas, as they can cause fibrosis, discoloration, and skin puckering if they go untreated.¹³

Skin flap necrosis, a feared complication of rhytidectomy, occurs as a result of compromised blood flow to the distal ends of the skin flap. Predisposing factors for the development of skin flap necrosis include poor flap design, excessive closing tension, injury to the subdermal plexus, extensive subcutaneous flap elevation, underlying medical conditions, and the use of nicotine. Smoking and nicotine use have been shown to be the biggest, preventable contributing factors to skin necrosis, carrying with it a 12.6 times higher than in nonsmokers.¹⁸ Systemic diseases which increase risk include diabetes mellitus, peripheral vascular disease, and connective tissue disorders. When flap necrosis is suspected, antibiotics must be initiated immediately and the patient must start frequent massages to the area. Eschar formation is common in necrosis, and this area should be cleaned daily with

peroxide and dressed with antibiotic ointment. Although a disturbing complication to both surgeon and patient, most areas affected with flap necrosis will heal well by secondary intention with conservative management.¹³

Nerve damage is also a possible complication of rhytidectomy, with injury to the great auricular nerve being the most common. This occurs in approximately 1% to 7% of the patients undergoing rhytidectomy.¹⁹ Damage typically occurs when raising the skin flap near the postauricular and mastoid area, as the skin tends to be thinner. If nerve injury is noticed at the time of surgery, it should be primarily reanastomosed. While having a markedly lower incidence than great auricular nerve injury, motor deficits can occur with damage to the temporal branch and marginal mandibular branch of the facial nerve. As with injury to the great auricular nerve, if injury of the facial nerve is noted intraoperatively, primary anastomoses should be attempted. Although damage to a facial nerve branch is a devastating complication, approximately 85% of these injuries will resolve with time.²⁰ Bell palsy has also been reported after rhytidectomy, and it is important to discuss this possibility with patients who have previous history.²¹

Cosmetic complications of rhytidectomy include hypertrophic scarring, incision line irregularities, and earlobe deformity. Scarring can occur as a result of excessive tension on the flap closure, and usually presents in the first 2 to 12 weeks postoperatively. Surgeons can attempt intralesional steroid injections and proceed to surgical excision and primary closure if necessary. Surgical excision should not occur before 6 months postoperatively.¹³ Incision line irregularities are seen with poor surgical planning and may lead to alopecia or poor hairline pattern. Hair loss can be temporary or permanent and may require hair transplants or local flaps to repair. Earlobe deformity or "Satyr ear" occurs as a result of the insufficient earlobe tacking. As the ear heals, the lobe is pulled inferiorly. Repair of this deformity, although difficult, can be achieved with a V-Y plasty technique to recreate the inferior lobe sulcus.¹³

Facial Implants

Facial implants have seen expanded use over the past decade with improvement in biomaterial and design. Such improvement has also led to reduced morbidity and ease of implantation. The main goal of implant use is augmentation of the skeletal structure and restoration of facial contour. They can also be used in combination with rhytidectomy or other facial aesthetic procedures, as a multimodal approach to facial rejuvenation. Malar and mandibular implants constitute 2 of the most popular types of facial implants. Malar or cheek implants combat the visual effects of malar hypoplasia. Mandibular augmentation is used to create a more prominent mandibular profile and improved nose-chin relationship. There are currently several types of biomaterials available, and knowledge

of these is crucial in choosing an appropriate implant. All implant materials induce formation of fibroconnective tissue capsule. This capsule serves as a barrier between the host (the patient) and the implant.^{22,23} Complications of facial implants commonly occur as a result of a chronic, unresolved inflammatory response to the implant material. The response is also related to the characteristics of the implantation site, such as the underlying bone structure and the overlying skin.

The most common complications encountered with malar implants are asymmetry and malposition secondarily to poor placement. Hematoma and seroma formation may result from insufficient hemostasis intraoperatively, as well as excessive dissection. These fluid collections may provide a favorable environment for bacterial growth and subsequent infection. These collections can also cause excessive fibrosis and lead to lasting soft tissue abnormalities. Most alarmingly, pressure on the overlying tissue caused by the fluid can reduce blood flow and cause tissue necrosis. Small hematomas will generally resolve without treatment in 1 to 2 weeks. Larger hematomas, however, must be evacuated immediately and may sometimes require removal of the implant. Seromas may be drained percutaneously. Both hematomas and seromas are best avoided with strict blood pressure control in the perioperative period.²⁴ Rates of nerve dysfunction have been reported to be around 8%. It can occur from an oversized implant impinging on a nerve, as well as improper placement, traction, thermal, or direct traumatic injury from dissection. Luckily, this complication is typically temporary and will gradually improve over the course of several weeks.²⁵ Upper lip weakness can occur due to injury of the facial nerve at the time of surgery, or by postoperative edema. This risk can be mitigated by a conservative vertical mucosal incision and dissection performed parallel to and in between the zygomaticus major and minor muscles. Limiting subperiosteal dissection along the posterior zygomatic arch can also minimize this risk.²⁵

Infection is a potentially serious complication of malar implants, with infection rates estimated at 1.2% to 2.4%. Genial implants have a slightly lower incidence at 0.7% to 1.2%.²⁶ Early signs of infection include erythema and asymmetry. Unfortunately, removal of infected implants is often necessary. On occasion, salvage of the implant may be attempted with removal and resterilization of the implant. Prior to reinsertion, the surgical site must be debrided and copiously irrigated. A long course of postoperative antibiotics is also required. If symptoms do not improve, the implant is removed, with replacement delayed 6 to 8 weeks allowing for resolution of symptoms.²⁷

Otoplasty

Prominent ears represent a significant source of psychological and emotional distress. Although there are a number of surgical approaches for performing otoplasty, most involve

the creation of a natural antihelix and conchal setback. Complications of otoplasty are categorized by the timing of their occurrences.

One of the early complications encountered is hematoma formation, which may be the result of inadequate intraoperative hemostasis. Removal of the sutures in the affected area and drainage of the collection of blood can address this problem. Diagnosis and treatment must be done expeditiously to minimize risk of infection or skin necrosis. Infection can also occur as a result of lack of proper sterile surgical technique, late hematoma, or wound dehiscence.²⁸ Infections must be treated with intravenous antibiotics as the resulting chondritis can lead to dramatic deformity of the ear.

Late complications commonly include excessive scar formation, recurrence of the initial deformity, and development of new deformity. Scar formation, primarily hypertrophic or keloid scarring, can often be managed with serial intralesional steroid injections. Recurrence of the initial deformity occurs as a result of suture failure, insufficient quantity of sutures, or inadequate scoring of the cartilage. This requires reoperation, typically 6 months after initial intervention. Postoperative ear deformities include telephone deformity, reverse telephone deformity, and narrowing of the external auditory canal, which all require surgical correction.²⁸

Brow Lift

The brow lift procedure has undergone substantial evolution over the past two decades, with a transition from the tradition approach to the endoscopic approach. There exists a significant debate as to which is the best procedure for lifting the brow, and the decision is largely left up to the individual surgeon. The direct brow lift offers the surgeon substantial control over the degree of lift achieved, and the ability to contour the brow easily. Therefore, when the goal is to lift the entire eyebrow, the direct approach is generally taken. However, many surgeons and patients dislike the idea of having a visible scar. Despite the risk of scar, most patients are satisfied overall with the outcome of the direct brow lift, and scars are rarely consequential. Endoscopic brow lift is a popular option, as it requires minimal incisions and results in scars that are essentially unnoticeable. In addition, as it is a minimally invasive procedure, it is generally possible to obtain satisfactory cosmetic results with reduced tissue trauma.^{29,30}

The goal of brow surgery is, in general, to elevate the brows and at the same time decrease forehead and glabellar rhytids, lateral canthal hooding, and infrabrow skin. Complications of endoscopic brow lift include nerve damage, hematoma, and infection, with the most concerning being injury to the temporal branch of the facial nerve. Hematoma is rare but can be prevented with placement of a surgical drain if there is intraoperative concern for bleeding. If it occurs, it can generally be treated with aspiration of the blood products.^{31,32} Although direct nerve injury is rare, postoperative neuropraxia is more common and is usually temporary.

Direct brow lift carries with it risk of similar complications, including hematoma, nerve injury, and infection. As with other surgical procedures, hematomas typically occur as a result of inadequate intraoperative hemostasis. Infections are uncommon, but can be treated with oral antibiotics. Hair loss of the brow can occur with improper incisional placement. Again, neuropraxia is generally transient.²⁹ Some surgeons may also perform what is called a trichophytic, or subcutaneous brow lift, particularly in patients with high hairlines or long foreheads, as the procedure will simultaneously bring down the hairline while lifting the brow. This carries risk of the same complications of endoscopic and direct brow lift, with hair loss and scarring being the most common.³¹

Blepharoplasty

While many of the complications of blepharoplasty are similar to those of any surgery performed, such as infection, ecchymosis, and bleeding, other complications are more unique and, in some ways, much more impactful on the patient. Some of these include retrobulbar hematoma, xerophthalmia, corneal abrasion, and even blindness. Though these complications are extremely important and can have devastating consequences for the patient, in this review, we will focus more directly on the cosmetic complications. For simplicity's sake, cosmetic adverse events can be broken down into those involving the upper eyelid and those involving the lower eyelid.

Some of the more commonly encountered upper eyelid complications include lagophthalmos (incomplete upper eyelid closure), asymmetry, postoperative ptosis, medial canthal webbing, and superior sulcus defect. Such complications tend to occur as a result of poor surgical planning, as well as improper execution. Prior to the planned procedure, the surgeon must evaluate dynamics of each individual patient with regard to the forehead, the brows, and upper eyelids. This is the best way to determine the extent of surgical resection indicated and to make an accurate assessment of whether or not surgery is even indicated. It can be difficult to distinguish a genuine excess of upper eyelid skin from true eyelid ptosis and from brow ptosis. The surgeon must assess whether the "tired look" that patients commonly refer to when seeking cosmetic surgery is caused by a problem with the brow, the eyelid, or both.³³

The position of the eyelid crease is a crucial landmark in upper lid blepharoplasty. Proper assessment requires preoperative planning and surgical markings to be made with the patient in the upright sitting position with a neutral gaze. The primary incision is typically concealed in the supratarsal fold, which is located approximately 7 to 10 mm above the ciliary margin (7-8 mm in men, 8-10 mm in women). The surgeon should extend the incision laterally, with care to avoid extension as far as orbital rim, as a noticeable scar may result. Medially, the incision should not extend beyond the medial canthus. Incisions that extend too far medially may

cause medial canthal webbing via extension to the nasal sidewall. After the ptosis repair is complete, the eyelid crease must be reformed. Some patients do not actually have excessive upper lid skin but have a high crease instead. Failure to recognize these patients can result in excess skin removal, leaving a hollowed appearance.³³

Ptosis is an important topic of discussion in blepharoplasty, as failure to properly diagnose it preoperatively can cause postoperative issues. There are several different types of ptosis, including aponeurogenic, myogenic, neurogenic, mechanical, or pseudoptosis.³³

Preexisting asymmetry of the brows and/or upper eyelid is the most common cause of postoperative asymmetry. As is such, it is of the utmost importance to identify these asymmetries preoperatively. One of the most common postoperative asymmetries occurs as a result of improper excision of fat. Proper preoperative planning involves evaluation of pseudo fat herniation in the awake, nonsedated patient. Fat removed during surgery should only be that which is removed easily, and not fat which needs to be aggressively pursued. The excised fat should be kept in the operating room until the conclusion of the case, so that if asymmetries are noted prior to completion it can be reimplanted. If the asymmetry is not noted until a later time, a revisional procedure can be performed using autogenous fat from the patient.³³

Lagophthalmos is a common occurrence in the immediate postoperative period and typically resolves within 48 hours. The etiology is usually eyelid edema, in combination with intraoperative anesthetic injection. Although some lagophthalmos is accepted in the early postoperative period, lagophthalmos greater than 4 mm, or lagophthalmos that persists beyond 48 hours, is an indication of excessive upper lid skin removal. It is important to recognize this complication early, as it can be treated with grafting of the excised skin. Using the patient's own skin allows for a perfect match in terms of color and skin thickness. The excised skin can be kept safely for up to 3 weeks if stored properly in normal saline and refrigerated. This allows time for postoperative edema to resolve prior to reimplantation of the skin. Although many cases of lagophthalmos resolve with observation and conservative measures such as massage, significant untreated lagophthalmos can result in severe xerophthalmia, chemosis, and corneal damage.³³

Lower eyelid complications include strabismus, ectropion, entropion, scleral show, lower lid retraction, lateral sulcus rounding, and overreduction of lower lid fat. Here, we will discuss some of the more commonly encountered entities. As with upper eyelid blepharoplasty, complications can best be avoided with careful preoperative examination and planning.

Strabismus may occur as a result of injury to extraocular muscles. The most commonly implicated muscle injury involves the inferior oblique, which leads to diplopia. As with lagophthalmos, this is usually temporary. The rate of occurrence of diplopia and strabismus postoperatively can be

reduced by ensuring meticulous avoidance of the inferior oblique muscle during dissection. Care should also be taken to avoid unnecessary thermal injury (e.g., with cautery) to the orbital musculature.

Lateral sulcus rounding, which is a separate entity from lid malpositioning, typically results from scarring secondary to incision. This may also occur as a result of upper and lower incisions that are too close together, causing adhesions. Multiple techniques have been described to repair this complication, including outer or inner lamellar grafts, as well as locoregional advancement flaps.³³

Overexcision of periorbital fat is one of the most unfortunate complications of lower lid blepharoplasty and can result in the patient having a hollowed-out, sunken-in appearance to the eyes. Excessive excision of periorbital fat often results in prominence of the infraorbital rim, giving an aged appearance. This complication can be addressed with the use of volume fillers, ranging from autologous fat transfer to hyaluronic acid. Excessive fat reduction can also lead to lower eyelid skin redundancy, which should be addressed with the patient preoperatively. Excision of periorbital fat is a delicate balance between over- and underexcision, as underresection may inadequately treat the pseudo fat herniation and subsequently lead to a revisional procedure.³⁴

Resurfacing and Peels

Laser resurfacing, first used by physicians in the mid-1980s, has experienced tremendous growth in popularity with the increasing sophistication of the available technology.¹³ The carbon dioxide (CO₂) laser is the most commonly used, but newer lasers such as erbium:yttrium aluminium garnet (YAG) and neodymium:YAG lasers are also being used in practice. The general concept of lasers for skin resurfacing is that of "selective photothermolysis," meaning that the surgeon can select a wavelength that will be primarily absorbed by the target tissue component. This target tissue is called the chromophores, which for CO₂ lasers and erbium:YAG lasers is water. The epidermis is comprised of 90% water and is thereby the primary tissue target of these lasers. This concept is important to conceptualize, as it allows for more thorough understanding of the complications associated with laser resurfacing.¹³

Pre- and postprocedure management is a key factor in reducing complications associated with laser resurfacing. Although opinions between physicians differ regarding the need for pretreatment of the skin with medications such as hydroquinone, isotretinoin, and glycolic acids, most surgeons agree on importance of sun avoidance prior to the procedure. Sun exposure may lead to melanocyte activation, thereby predisposing the patient to hyperpigmentation as an adverse effect of the procedure. In addition, as with chemical peels, there is a risk of reactivation (or activation) of a herpetic infection. This danger can be avoided with antiviral therapy 24 to 48 hours before the scheduled resurfacing procedure, and therapy should be continued for 10 to 14 days

afterward. Despite the use of prophylaxis, viral infections may occur, and must be treated aggressively with high-dose antivirals. The use of prophylactic antibiotics and/or antifungals is more controversial but is still an accepted option for preventing postprocedure bacterial or fungal infections.³⁵ Bacterial and fungal infections post procedure significantly increase risk of scarring, and must also be treated aggressively. Contact dermatitis may also occur after laser resurfacing—usually as a result of topical ointments. Treatment involves discontinuation of the causative agent, in addition to topical and/or systemic steroids.¹³

Hyperpigmentation is a common, and typically transient, complication of laser resurfacing and tends to occur 2 to 6 weeks postoperatively. It is caused by sunlight and will usually resolve with further sun avoidance. Topical treatments include hydroquinones and retinoic acid. Mild topical steroids may also be used to treat hyperpigmentation. In contrast, hypopigmentation, which occurs in approximately 10% to 30% of the patients, is an unpredictable and permanent adverse event. Scarring, the most dreaded of complications, can be treated with intralesional steroid injections, as well as topical steroids. The most commonly affected areas of the face include the upper lip, mandible, and malar prominence.

Facial peeling is an important tool in the armamentarium of facial aesthetic surgeons. It allows for the treatment of common cosmetic problems including photodamage, acne, postacne scarring, facial pigmentation, and aging skin.²⁹ The concepts for chemical facial peeling and resurfacing procedures have been around for centuries, but like all aesthetic procedures, they have undergone significant progress over the past several decades.³⁶ The most simplified objective of chemical facial peeling is to cause destruction of skin cells at a certain depth without causing unwanted damage. Chemical peels range in the targeted depth from very superficial to deep, with the goal depth being largely based on the type of chemical agent used. Some of the more commonly used agents include glycolic, lactic, and salicylic acids.

Although much of the time chemical peels and facial resurfacing procedures are performed in the office setting, there are serious complications that the performing physician must be aware of. Some of the most common complications include pain and burning, hyper- and hypopigmentation, infection, scarring, and allergic reaction. More severe complications include toxicity, laryngeal edema, and ocular complications such as chemical conjunctivitis and corneal abrasion. Pain and burning commonly occur during chemical peels and can persist for several days post procedure. These symptoms can usually be successfully managed with ice application, topical lotions such as calamine or hydrocortisone, emollient creams, and sunscreen. Hyperpigmentation is one of the most common complications after a peel and can occur at any time post procedure. This can be best avoided by educating the patient about avoiding postpeel sun exposure, proper use of sunscreen, and proper pre- and post-procedure use of hypopigmenting agents. Hyperpigmentation

is treated with hypopigmenting creams such as hydroquinone, tretinoin, and sometimes steroids.³⁰

Bacterial infection, although less common, must be treated with oral and topical antibiotics, as scarring can occur. Viral and fungal infections can also occur after chemical peels. Herpes simplex infection can be activated after a chemical peel and results in painful, grouped vesicle eruptions on the face. Herpetic infections can be treated successfully with antiviral agents such as valacyclovir. Early detection and treatment prevents scarring. Patients with a history of herpes simplex virus should be pretreated with acyclovir prior to the chemical peel, and for 7-14 days after, to prevent this complication.³⁷ Fungal infections, most commonly with *Candida* species, occur more commonly in patients with a recent history of antibiotic use, prolonged steroid use, and immunocompromised patients. This is treated with topical clotrimazole, as well as systemic antifungals such as fluconazole. Significant pruritus in combination of papules and erythema may indicate an allergic reaction to the peel. The most common allergic reaction to chemical peeling is contact dermatitis, which must be treated quickly to avoid scarring. Scarring in itself is an uncommon, yet dreaded complication of peels, and typically occurs in medium or deep peels. Treatments for scarring include massage, topical, oral, or intralesional steroids, surgical revision, and laser therapy.³⁸

Ocular complications are extremely dangerous and should be immediately addressed with copious eye flushes. Normal saline is used for eye flushing after most peels, but mineral oil should be used instead if a phenol peel was used. Laryngeal edema has been reported after phenol peels and usually develops within the first 24 hours. Symptoms of laryngeal edema include stridor, voice changes, and tachypnea. It is thought that this complication may be secondary to a hypersensitivity reaction and tends to occur in patients with a history of cigarette smoking. Conservative management includes warm mist therapy, but airway compromise may lead to more serious interventions such as intubation or tracheostomy. Toxicity may occur after peels—most commonly with use of phenol—and tends to occur when the peel is applied over a large surface area of skin. This may present with nausea, disorientation, tinnitus, and even life-threatening cardiac arrhythmia.³⁹ The best management of such complications is simply to avoid them, with care and attention given to the amount and frequency of a particular chemical agent being administered to the individual patient.

Fillers

Injectable fillers have become a popular trend in cosmetic medicine, especially with the increasing popularity of social media, as it offers a “quick fix” to many of the most common aesthetic concerns. Volume loss is one of the hallmarks of the aging face, and facial fillers offer an effective way to treat much of it without undergoing the risks and complications

associated with a traditional operative procedure. This is especially true in younger patients who are seeking to conceal the very early signs of aging.⁴⁰ There is currently a wide variety of facial fillers to choose from, and they can vary quite widely in their biological characteristics and behaviors. Current estimates suggest there are more than 120 filler products or devices currently available.³⁰ Hyaluronic acid and collagen-derived products are currently the dominant forces in facial fillers. Approximately 78% of the soft tissue facial fillers used are comprised of hyaluronic acid.⁴⁰

Some of the most common complications of injecting facial fillers include bleeding at the site of injection, bruising, edema, asymmetry, surface irregularities, and migration of filler. These complications are typically transient and will self-resolve. One of the rarer and more serious complications is tissue necrosis, which results from improper injection, such as overinjecting or injecting with sufficient pressure to cause tissue blanching. Bruising, although disconcerting to the patient, will self-resolve. This can be partially avoided by ensuring the patient stops elective supplements such as St. John's wort and other herbal supplements with anticoagulant properties at least 1 week prior to the procedure.⁴¹ Bruising, as well as edema, can also be managed well by applying ice to the affected area for the first 48 hours post procedure.⁴² Oral steroids are also an option for more severe cases. Immediate edema can also lead to a second complication of overinjection or misplacement of filler, as anatomical landmarks may become obscured. In cases of excessive injection, massage can help redistribute the filler and improve the appearance. In circumstances when massage does not resolve lumps or bumps, and a hyaluronic acid product has been used, hyaluronidase can be used to dissolve the problematic area.⁴¹

Facial asymmetry results from either an overcorrection or an undercorrection of one side. At times this can go unnoticed at the time of procedure because of edema. This highlights the importance of postfiller follow-up appointments to ensure that symmetry has been achieved. If it has not, it can often be addressed by injecting more filler to the undertreated side, or if hyaluronic acid has been using, hyaluronidase can be used to decrease the volume of the undertreated side. Lumping and surface irregularities are some of the more common adverse effects, particularly in novice injectors. Massage is the best way to both prevent and treat this complication.⁴² Migration of filler can occur from overly aggressive injection but may also occur from compression of tissue by patient massage or normal oral function in the immediate postinjection period. Hyaluronic acid fillers carry the benefit of being able to be quickly and successfully reversed with hyaluronidase.³¹

Summary

With the rising popularity of, and demand for, facial aesthetic surgery, comes an increased need for recognizing,

understanding, and managing the complications of such surgeries and procedures. The goal of this review article was to shed light on some of the more common complications of the most frequently performed procedures in the world of facial aesthetic surgery today. The underlying theme for all of the abovementioned procedures is that prevention is the best way to treat a complication. However, to have successful practices and achieve positive outcomes for their patients, facial aesthetic surgeons must have firm grasps on how to manage complications when they do occur.

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