Nonsurgical Rejuvenation of the Aging Face With Injectable Poly-L-Lactic Acid for Restoration of Soft Tissue Volume

Clark Friedrich Schierle, MD, PhD; and Laurie A. Casas, MD

Abstract

Background: Characteristics of the aging face include soft tissue atrophy, loss of skin elasticity resulting in excess facial skin, and gravitational descent or ptosis of facial soft tissues. Poly-L-lactic acid (PLLA) is a synthetic biodegradable polymer that provides soft tissue augmentation through stimulation of an inflammatory tissue response with subsequent collagen deposition.

Objective: The authors discuss the special considerations inherent in facial aging, describe the mechanism of action and indications for a new PLLA filler under consideration for Food and Drug Administration (FDA) approval (Sculptra Aesthetic; sanofi-aventis US, Bridgewater, New Jersey), and detail the results of a two-year off-label pilot study with the product.

Methods: The senior author (LAC) treated 106 patients with PLLA in an off-label indication, as part of a pilot study while Sculptra Aesthetic was being evaluated for FDA approval for cosmetic indications. All patients were followed up for two years to help develop a protocol for injection technique.

Results: The age range of patients in this series was 40 to 78 years. Three patients were male and 103 were female. Patients received an average injection of 1.6 vials per session, over an average of 2.3 sessions, to achieve volume restoration in the tear trough, midface, malar region, nasolabial folds, prejowl area, mandibular border, and mandibular angle. The authors achieved 100% follow-up with 99.1% patient satisfaction. The rate of nodule formation was 4.7% at a minimum follow-up of two years.

Conclusions: Because of its unique mechanism of action, PLLA for nonsurgical facial rejuvenation requires meticulous injection technique with special considerations for optimizing outcomes and minimizing adverse events.

Keywords
injectable poly-L-lactic acid (PLLA), Sculptra, nonsurgical facial rejuvenation, cosmetic medicine, facial volume restoration, soft tissue augmentation, medical aesthetics, soft tissue facial atrophy

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In recent years, our understanding of the anatomical changes associated with facial aging has expanded dramatically. It is clear that in addition to excess skin laxity and gravitational descent of the soft tissue envelope, facial aging also results in a loss of soft tissue volume, erosion of critical bony landmarks, and deterioration in skin quality.1-4 Comprehensive treatment of the aging face requires a thorough understanding and skillful application of the full spectrum of surgical and nonsurgical treatments. The authors believe that a longitudinal approach is ideal, including nonsurgical treatments to address skin quality, soft tissue volume loss, and skeletal deficiencies, as well as surgical treatment of skin and soft tissue ptosis.
mechanism of action, it behaves entirely differently than both traditional injectable fillers and fat injections. The senior author (LAC) has successfully treated 106 consecutive patients with two years of follow-up in an off-label fashion as part of a pilot study. On July 29, 2009, the Food and Drug Administration (FDA) approved an aesthetic indication for the product and its application has become more widespread as a result. Several critical technical considerations have emerged from our experience that have helped to optimize results while minimizing adverse events; those considerations are outlined here, along with an overview of facial aging and information about the Sculptra product itself.

**NONSURGICAL TREATMENT OF THE AGING FACE**

Common features of the aging face include soft tissue and bony atrophy, loss of skin elasticity, and gravitational descent or ptosis of the facial soft tissues. Nonsurgical treatment may address issues of skin quality and volume depletion; for example, skin quality can be improved with thermal or light energy–based therapies, topical tretinoin, chemical peels, and sun avoidance. Volume restoration is typically treated with a traditional soft tissue filler or fat grafting. Both of these modalities depend on volume persistence for the material injected, which can be unpredictable and short-lived. Injection of 1 mL of fat or traditional filler results in a one-to-one increase in soft tissue volume with variable durability and persistence.

Facial soft tissue augmentation with Sculptra Aesthetic can be even more difficult to predict. Sculptra Aesthetic acts through a process of encapsulation and stimulation of an inflammatory response, ultimately resulting in collagen deposition with dermal fibroplasia. Thus, it is associated with a larger and more durable increase in volume per vial than traditional fillers. As a result of this mechanism of action, however, the volumizing effects of Sculptra Aesthetic are only revealed in a delayed fashion. This poses challenges for the treating physician who is accustomed to seeing immediate volumization as a treatment endpoint. Further, if inappropriately prepared or administered, adverse reactions such as nodule or granuloma formation may result. However, if injected properly, as described below, our experience has shown Sculptra Aesthetic to be a powerful and unique tool in the arsenal for nonsurgical treatment of the aging face.

**SCULPTRA’S MECHANISM OF ACTION**

Poly-L-lactic acid (PLLA) is a member of the alpha-hydroxy acid family. It is biodegradable and biocompatible, and it has been useful in other forms for numerous medical applications such as absorbable sutures and mesh, plates, and screws for many years. Sculptra is composed of PLLA microparticles, sodium carboxymethylcellulose, and nonpyrogenic mannitol. PLLA serves as the durable active ingredient of Sculptra Aesthetic. The mannitol improves lyophilization of the particles and the carboxymethylcellulose serves as an emulsifier, improving rehydration. Sculptra received initial FDA approval for restoration and correction of HIV-associated facial lipoatrophy but (as stated earlier) has now received approval for aesthetic indications.

Once injected, the PLLA component is hydrolyzed into lactic acid monomers, which induce a localized tissue inflammatory response recruiting monocytes, macrophages, and fibroblasts. A capsule is formed around each individual microsphere as the lactic acid is metabolized, resulting in increased collagen deposition by host fibroblasts. The end result is dermal fibroplasia and subsequently-increased dermal thickness. The product is provided in a freeze-dried powder that requires rehydration prior to injection. Below we describe our techniques for PLLA hydration, patient preparation, injection, and posttreatment care, which have optimized results in our practice.

**METHODS**

**Patient Assessment**

During the course of a pilot study from 2006 to 2008, the senior author (LAC) treated 106 consecutive patients with Sculptra Aesthetic in an off-label fashion. All patients demonstrated stigmata of facial aging but refused surgical facial rejuvenation and, as such, were enrolled in the study for off-label use of PLLA, with the understanding that this medical aesthetic treatment was not a substitute for surgery. Three patients had undergone previous facial rejuvenation surgical procedures at three, 19, and 20 years prior to this study.

Patients were assessed for three critical factors in facial aging in order to plan their treatment regimen. These included skin elasticity, subcutaneous volume deficit, and relative adherence of the skin to the underlying superficial muscular aponeurotic system (skin-SMAS adherence). All of these factors relate to the youthfulness of the skin and we found them to be important in guiding the patients’ response to treatment. Subcutaneous soft tissue volume and facial skeletal support deficits were also assessed. Of note, none of the male patients was on any pretreatment skin quality optimization regimen.

Taking into account the assessment, each patient’s budget, and time constraints, one-half to two vials were administered per session. Each session was spaced one to six months apart, depending on the patient’s schedule. A total of one to eight sessions was needed for complete volume restoration, depending on pretreatment volume deficit. A staged approach allowed time for the product to reach its maximal volume effect between treatments, while also allowing the patient to distribute the financial burden of treatment over multiple sessions. If multiple sessions were anticipated from the outset, sessions were generally spaced at one- to two-month intervals. If one
session was planned, four to six months were allowed to pass, to ensure that Sculptra Aesthetic had achieved full volumization prior to reassessment and any necessary retreatment.

Treatment planning was based on a global evaluation of the patient's skin elasticity, soft tissue volume deficit, and degree of skin-SMAS adherence. Volume deficit was assessed and noted in each of the following anatomic regions: malar eminence, midface, zygomaticotemporal region, buccal region, tear trough and orbitomalar grooves, nasolabial folds, prejowl recess, preauricular depression, mandibular border, and mandibular angle. Patients with good skin elasticity, mild volume deficit, and a relatively adherent skin-SMAS relationship typically required only one or two vials in the malar and midfacial regions. Those displaying good or fair skin elasticity, moderate volume deficit, and relatively adherent skin-SMAS relationship were scheduled to receive three to six vials. These patients typically required treatment in the malar, tear trough, orbital malar, prejowl, nasolabial fold, and mandibular regions (ie, panfacial treatment).

We found a great deal of variability in Sculptra Aesthetic requirements in this population, dependent on whether they underwent pre- and posttreatment skin quality optimization with topical tretinoin. Patients exhibiting poor skin elasticity, severe volume deficit, and a relatively nonadherent skin-SMAS relationship generally required more than seven vials of panfacial treatment. These patients should be counseled to consider fat injections as an alternative, given the financial burden of such a large number of vials required for treatment.

**Pretreatment Protocol**

Patient skin quality was optimized before Sculptra Aesthetic treatment through a rigorous medical skin care regimen. Topical tretinoin was administered at 0.025% QHS until tolerated, then increased gradually to 0.05% QHS. Topical tretinoin could be mixed with a hydroquinone-based product to ease distribution and help with hyperpigmentation. Ideally, patients must tolerate at least the 0.025% QHS regimen without evidence of skin irritation prior to treatment with Sculptra Aesthetic. In our experience, pre- and posttreatment with topical tretinoin has had a profound effect on the outcomes of Sculptra Aesthetic injections. Topical tretinoin is known to have positive effects on skin quality, vascularity, and collagen synthesis in the setting of resurfacing treatments and appears to have a synergistic effect with the neocollagenic mechanism of Sculptra Aesthetic.5

**Product Preparation**

Sculptra Aesthetic is provided as a freeze-dried solid, supplied in a clear glass vial. It is stable at room temperature for up to two years in its lyophilized form. The manufacturer recommends the addition of 5 mL of sterile water to each vial, with a subsequent two-hour rehydration period. We experienced a significant reduction in rates of undesired nodularity when the product was allowed to hydrate for at least 48 hours prior to injection. We rehydrated each vial with 6 mL of sterile water, supplemented with 2 to 4 mL of 2% plain lidocaine (Hospira, Inc., Lake Forest, Illinois) at the time of injection depending on the planned total volume to be injected (typically 8-10 mL).

**Treatment Protocol and Injection Technique**

Patients were photographed, and treatment sites were planned and marked. Patients were then prepared by washing their skin with soap and water. The areas to be treated were outlined so that the patient could observe, allowing him or her to be an integral part of the treatment planning. Full informed consent was given, which during the pilot study included acknowledging the off-label application of this product. A topical anesthetic cream (20% benzocaine/6% lidocaine/4% tetracaine, “BLT”; Rox San Pharmacy, Beverly Hills, California) was applied and allowed to take effect prior to injection. The hydrated product was drawn into a 3-mL Luer-Lok (BD, Inc.,
Franklin Lakes, New Jersey) syringe with an 18-gauge needle, and injection was carried out with a 25-gauge, 1-inch hypodermic needle.

Selecting the correct plane of injection proved to be critical. Whereas the manufacturer recommends intradermal injection, we found that injection into an immediately subdermal plane resulted in far easier, more consistent delivery of material with far fewer adverse events such as nodularity and granuloma formation. A lattice of 0.05- to 0.1-mL injections spaced 1 cm apart was planned to evenly distribute the product over the area to be treated (Figure 1). Alternatively, fanning, tunneling, or depot-based techniques may be employed to decrease the number of needle sticks required as the treating provider gains experience and comfort with the product.

Alternate sides of the face were treated. The patient was then instructed to hold pressure over the treated area for five to seven minutes while the other side was treated. At that point, pressure was held over the second side while vigorous massage was begun over the first treated side to ensure even distribution. After massage was complete, an ice pack was applied to the treated areas for 15 minutes. Another seven minutes of massage per treated area was then performed.

The authors demonstrate their technique for pretreatment marking and subsequent injection of three patients in Videos 1 through 3 (www.aestheticsurgeryjournal.com).

**Posttreatment Protocol**

Patients were instructed to massage the treated areas five times per day, for five minutes, for five days. Some patients chose to use a small handheld massager (Buzz Pinpoint Mini Personal Massager; Brookstone, Inc., Merrimack, New Hampshire) for ease and comfort. This helped to further distribute the product, as well as to stimulate the physiologic response to the Sculptra Aesthetic microspheres. There were no restrictions on physical activity.

**RESULTS**

Of the 106 patients, three were men ranging in age from 63 to 72 (average, 68 years) and 103 were women ranging in age from 40 to 78 (average, 58 years). In our series, an average of 2.3 sessions was required for female subjects and 5.6 sessions for male subjects, with an average of 1.6 vials administered per session at a cost of $900 per vial.

Patient outcomes and satisfaction were recorded prospectively. All patients were treated until a satisfaction score of four or greater on a five-point scale was achieved, by photography and visual assessment from both the treating physicians and the patient. We achieved 100% follow-up with 99.1% satisfaction. The anatomical region of injection, volume needed to achieve optimal patient satisfaction, and adverse events were recorded and analyzed. The pretreatment, treatment, and posttreatment protocols presented are the result of meticulous data analysis and optimization over the course of the study. Photo documentation was obtained pretreatment, at each session, and four to six months after the last session (which was defined by full patient satisfaction and physician determination of full volume correction). Representative cases are presented in Figures 1 to 6. As some patients are now reaching three to

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**Figure 2.** (A) The illustration demonstrates the grid of planned treatment. (B) This 46-year-old woman presented with a flattened midface, lack of malar projection in silhouette, and an orbitomalar groove (seen on the patient’s left.) (C) Two years after a single treatment with two vials of Sculptra Aesthetic each rehydrated with 6 mL of sterile water and 3 mL of 2% of lidocaine, for a total volume of 9 mL in each malar/midface region. The patient was also given topical tretinoin pre- and posttreatment. After treatment, improvement is evident on the right malar silhouette, with effacement of the orbitomalar groove on the left.
Figure 3. (A) The illustration demonstrates the grid of planned treatment. (B, D, F) This 48-year-old woman presented with a midfacial volume deficit and uneven pigmentation. (C, E, G) Two years after a single treatment with one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine, for a total volume of 4.5 mL in each malar/midface region. She was also given topical tretinoin pre- and posttreatment. After treatment, the patient shows volume improvement in her midfacial area.
Figure 3. (continued) (A) The illustration demonstrates the grid of planned treatment. (B, D, F) This 48-year-old woman presented with a midfacial volume deficit and uneven pigmentation. (C, E, G) Two years after a single treatment with one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine, for a total volume of 4.5 mL in each malar/midface region. She was also given topical tretinoin pre- and posttreatment. After treatment, the patient shows volume improvement in her midfacial area.
Figure 4. (A, B) The illustration and clinical photo show the grid of planned treatment. (C, E) This 64-year-old woman had undergone a facelift and upper/lower blepharoplasty by the senior author (LAC) 20 years prior to presentation. She was seeking facial rejuvenation for midfacial volume deficit, moderate nasolabial folds, and prejowl soft tissue deficit. (D, F) Two years after staged panfacial treatment with two sessions spaced two months apart. She was also given topical tretinoin pre- and posttreatment. During the first session, the patient was injected with one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine for a total volume of 3 mL in each malar/midface region and 1.5 mL in each prejowl region. During the second session, the patient was injected with 1.25 vials of Sculptra Aesthetic rehydrated with 7.5 mL of sterile water and 3.75 mL of 2% lidocaine for a total volume of 4.5 mL in each malar/midface region and 1.125 mL in each prejowl region.
four years of follow-up, we are beginning to see the need for touch-up treatment. Thus far, no patient has required more than a single vial for retreatment.

**Illustrative Cases**

Six illustrative cases are shown to detail the pretreatment planning, injection technique, number of vials, and sessions required for full facial volume restoration of the treated areas. In case 1 (Figure 2), a 46-year-old woman with good skin elasticity, mild volume deficit of the midface and malar regions, and an adherent skin-SMAS relationship received two vials of Sculptra Aesthetic in a single session to fully correct the volume deficit. In case 2 (Figure 3), a 48-year-old woman with good skin elasticity, spotty hyperpigmentation, mild midfacial volume deficit, and an adherent skin-SMAS relationship began a comprehensive daily skin care regimen that included topical tretinoin and hydroquinone. She then received a single vial of Sculptra Aesthetic injected to the bilateral midface in a single session to achieve full volume restoration. Case 3 (Figure 4) was a 64-year-old woman with fair skin elasticity, excellent skin color and texture, moderate panfacial volume deficit, and an adherent skin-SMAS relationship. Of note, the patient had undergone a facelift and bilateral upper and lower blepharoplasty 20 years prior to treatment and was highly compliant with a daily skin care regimen, including topical tretinoin. After assessment, a staged plan was formulated, with 2.25 vials of Sculptra Aesthetic administered over two sessions to restore midface, malar, nasolabial fold, tear trough, and prejowl areas (ie, panfacial restoration). Case 4 (Figure 5) was a 64-year-old woman with fair skin elasticity, spotty hyperpigmentation, a moderate volume deficit of malar, midface, and tear trough regions, and an adherent skin-SMAS relationship. She had undergone facelift and bilateral upper and lower blepharoplasty five years prior to treatment by another provider. She had experienced sequelae from her previous surgical treatments, including bilateral lower lid ectropion and pixie earlobe deformity; these are evident in the clinical photographs. Over two sessions, she received three vials of Sculptra Aesthetic, which significantly alleviated the existing lagophthalmos, tear trough deformity, and malar/midface volume deficits. At the time of the clinical photos, the patient’s nasolabial folds, prejowl region, mandibular border and angle, and pixie earlobe deformity still needed additional treatment. In case 5 (Figure 6), a 69-year-old woman presented with good skin elasticity, markedly uneven skin...
Figure 5. (A) The illustration demonstrates the grid of planned treatment. Note that treatment was limited to malar and midface regions due to budget constraints. (B, D) This 64-year-old woman had undergone a facelift and upper/lower blepharoplasty by another provider five years prior to presentation. She was seeking facial rejuvenation for bilateral lower lid ectropion with panfacial volume loss in the malar, midface, tear trough, nasolabial fold, prejowl, and mandibular border and angle regions. (C, E) Two years after two treatments spaced two months apart with 1.5 vials of Sculptra Aesthetic per session rehydrated with 9 mL of sterile water and 4.5 mL of 2% lidocaine for a total volume of 6.75 mL in each malar/midface region per session. She did not undergo pretreatment with topical tretinoin, but did begin a posttreatment regimen. Posttreatment, the patient demonstrates restoration of soft tissue volume in the malar, midface, and tear trough regions with correction of ectropion and improvement in skin quality after initiation of topical tretinoin. Future treatment of nasolabial fold, prejowl, and mandibular border and angle areas will be performed as the patient’s budget allows.
Figure 5. (continued) (A) The illustration demonstrates the grid of planned treatment. Note that treatment was limited to malar and midface regions due to budget constraints. (B, D) This 64-year-old woman had undergone a facelift and upper/lower blepharoplasty by another provider five years prior to presentation. She was seeking facial rejuvenation for bilateral lower lid ectropion with panfacial volume loss in the malar, midface, tear trough, nasolabial fold, prejowl, and mandibular border and angle regions. (C, E) Two years after two treatments spaced two months apart with 1.5 vials of Sculptra Aesthetic per session rehydrated with 9 mL of sterile water and 4.5 mL of 2% lidocaine for a total volume of 6.75 mL in each malar/midface region per session. She did not undergo pretreatment with topical tretinoin, but did begin a posttreatment regimen. Posttreatment, the patient demonstrates restoration of soft tissue volume in the malar, midface, and tear trough regions with correction of ectropion and improvement in skin quality after initiation of topical tretinoin. Future treatment of nasolabial fold, prejowl, and mandibular border and angle areas will be performed as the patient’s budget allows.

Minimizing Complications

Our overall nodule formation rate was 4.7% (five patients: four in the prejowl area, one in the medial cheek) in 106 consecutive patients with at least two years of follow-up. We found a significantly reduced incidence of nodule and granuloma formation compared to what was anticipated, presumably due to the lengthened hydration protocol and sufficient rehydration volumes (as described in the section on injection technique). Our rate of complication compares very favorably with rates reported in the literature, some of which were as high as 52% for nodule formation. The most commonly-reported serious adverse events in the original VEGA US pilot study were lumps or nodules at the injection site, delayed granulomas, redness, pain, inflammation, swelling, hypersensitivity, and itching. Injection site nodules primarily occurred several months after injection, from one or two months to 14 months after the last injection of Sculptra Aesthetic. In most cases, the nodules resolved spontaneously over a maximum of nine months, although one patient asked that the firm nodule be mechanically agitated with a needle and lidocaine 1% to induce breakdown and facilitate resorption (which did occur after two short sessions). There have also been reports in the literature of delayed granulomas requiring corticosteroid injection. Serious hypersensitivity reactions have been reported, including severe facial swelling. In these reports, patients recovered without complication after treatment with intravenous corticosteroids and antihistamines. Our experience has shown that, with the modified hydration and injection protocols described, rates of complications can be significantly reduced.

In summary, with the anticipated increased use of Sculptra Aesthetic following its approval for treatment of the signs and symptoms of facial aging, injectors must familiarize themselves with the important technical considerations that can optimize patient satisfaction and
Figure 6. (A) The illustration demonstrates the grid of planned treatment. (B, D, F) This 69-year-old woman had undergone a facelift and upper/lower blepharoplasty by the senior author (LAC) 20 years prior to presentation. She did not follow a daily skin care regimen and presented with significant skin changes, including hyperpigmentation and actinic changes. She demonstrated panfacial volume deficit with need for soft tissue restoration in the midface, tear trough, nasolabial fold, prejowl, and mandibular border and angle regions. (C, E, G) Two years after staged panfacial treatment with three sessions spaced two months apart, with five vials of Sculptra Aesthetic and botulinum toxin chemodenervation of the glabella, lateral brow, and depressor anguli oris. The patient was also given topical tretinoin pre- and posttreatment. During the first and second sessions, the patient received two vials of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine each for a total volume of 5 mL in each malar/midface region, 1.5 mL in each prejowl region, and 2.5 mL along each mandibular border/angle. During the third session, the patient received one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine for a total volume of 2.5 mL in each malar/midface region, 0.75 mL in each prejowl region, and 1.25 mL along each mandibular border/angle. Note the improvement in panfacial volume deficit, skin quality, and brow ptosis.
Figure 6. (continued) (A) The illustration demonstrates the grid of planned treatment. (B, D, F) This 69-year-old woman had undergone a facelift and upper/lower blepharoplasty by the senior author (LAC) 20 years prior to presentation. She did not follow a daily skin care regimen and presented with significant skin changes, including hyperpigmentation and actinic changes. She demonstrated panfacial volume deficit with need for soft tissue restoration in the midface, tear trough, nasolabial fold, prejowl, and mandibular border and angle regions. (C, E, G) Two years after staged panfacial treatment with three sessions spaced two months apart, with five vials of Sculptra Aesthetic and botulinum toxin chemodenervation of the glabella, lateral brow, and depressor anguli oris. The patient was also given topical tretinoin pre- and posttreatment. During the first and second sessions, the patient received two vials of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine each for a total volume of 5 mL in each malar/midface region, 1.5 mL in each prejowl region, and 2.5 mL along each mandibular border/angle. During the third session, the patient received one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine for a total volume of 2.5 mL in each malar/midface region, 0.75 mL in each prejowl region, and 1.25 mL along each mandibular border/angle. Note the improvement in panfacial volume deficit, skin quality, and brow ptosis.
Figure 7. (A) The illustration demonstrates the grid of planned treatment. Note that no treatment was planned over the lateral zygomatic arch to avoid feminizing the malar region. (B, D) This 64-year-old man demonstrated panfacial volume deficits in the orbitomalar groove, midface, cheek, prejowl, and right mandibular border regions. (C, E) Two years after staged panfacial treatment with five sessions separated by three months, one year, three months, and six months, respectively. During the first session, the patient received two vials of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine each, for a total volume of 7 mL in each midface/cheek region, 1.5 mL in each prejowl region, and 1 mL along the right mandibular border. During the third through fifth sessions, the patient received one vial of Sculptra Aesthetic rehydrated with 6 mL of sterile water and 3 mL of 2% lidocaine for a total volume of 3.5 mL in each malar/midface region, 0.75 mL in each prejowl region, and 0.5 mL along the right mandibular border. The patient refused pre- and posttreatment with topical tretinoin. The patient demonstrates volume restoration of midface, cheek, prejowl, and right mandibular border regions. Note the minimal improvement in skin quality with no skin care or topical tretinoin.
minimize complications. Adequate rehydration of the material with sufficient diluent volume for a sufficient period of time has been instrumental in our reduction of nodule and granuloma formation. Pretreatment marking with a 1-cm grid representing 0.05- to 0.1-mL injections of material can aid in even distribution of material, and more advanced injectors may find success with fanning techniques to minimize injection sites. Injection in an immediately subdermal plane is critical, as intradermal injection may be prone to greater irregularities. Pretreatment assessment for three key metrics (skin elasticity, subcutaneous volume deficit, and skin-SMAS adherence) can help plan treatment volumes and predict response to treatment, accurately determining the need (or lack thereof) for a surgical approach. Last, we found pre- and posttreatment administration of topical tretinoin to be a synergistic adjunct in optimizing both pretreatment skin quality and the patient’s neocollagenic response to Sculptra Aesthetic treatment.

**CONCLUSIONS**

The poly-L-lactic acid stimulatory filler described in this article (Sculptra Aesthetic) has recently been approved by the FDA for cosmetic indications. In 106 consecutive patients with ages ranging from 40 to 78, we reliably achieved complete facial volume restoration through a staged approach with an average of 1.6 vials per session over an average of 2.3 sessions for full volume restoration of the midface, malar, tear trough, orbital malar grooves, prejowl recess, nasolabial fold, and mandibular border and angle regions. We have found Sculptra Aesthetic to be a reliable injectable product that gradually yet predictably promotes collagen deposition, resulting in a significant improvement in facial soft tissue volume deficits. If administered properly, Sculptra Aesthetic is an invaluable tool for appropriately trained physicians to treat the progressively aging face over time. Surgical intervention will never be replaced when there is a need to excise, reposition, and tighten the soft tissues of the aging face and neck, but it is only in combination with medical aesthetic treatments that address skin quality and soft tissue volume deficits that surgical treatments can yield their best results. In conclusion, Sculptra Aesthetic is a powerful and predictable volume restoration stimulator that should be added to the continuum of care for the patient seeking correction of volumetric changes found in the aging face.

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REFERENCES