Comprehensive Facial Rejuvenation Protocol Using Dermal Fillers: Bovine Collagen Gel Suspended Polymethylmethacrylate Microspheres and Hyaluronic Acid

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Facial rejuvenation centers upon optimized treatment of facial wrinkles and facial volume deficiencies created by the aging process. Dermal fillers are the preferred minimally invasive method for volume replacement.

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Evaluate the indications for placement, quantity of fillers, anatomical location, frequency of injections, and adverse effects of bovine collagen gel suspended polymethylmethacrylate microspheres (ART) in association with the use of Restylane Lyft (PERI).

**Methods:**

A retrospective review was undertaken of those patients choosing ART and PERI as part of a comprehensive facial rejuvenation protocol.

**Results**

From 2009 through 2015, 1,513 patients and 2,875 ART syringes were injected. There were 1.9 syringes/treatment, 2.9 months between treatment sessions with total syringes/patient: 0-5 44%, 6-10 33%, 11-15 11%, >16 11%. Three patients had firm areas and three had excess injection of ART. As the years progressed, the use of ART increased with 815 syringes injected in 2015. There were 321 PERI treatment sessions, 1.2 syringes/treatment, and a total of 389 syringes injected.

**Conclusions**

ART combined with PERI are valuable components to a comprehensive facial rejuvenation treatment strategy with a low incidence of complications. Microcannulas and lidocaine with epinephrine and bicarbonate can ease injection pressure, and minimize bruising, discomfort, swelling and adverse reactions.
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Introduction

We all appreciate facial beauty. The aging process steals our facial youthfulness by characteristically atrophying the skin, soft tissues and bony framework.\textsuperscript{1,2,3} Battling the aging process is a life-long endeavor. Procedures and technologies exist to lessen or fully correct facial wrinkles and volume deficiencies.

Fashion models are perceived as beautiful by displaying optimal facial features (Table 1). Facial rejuvenation centers upon striving to attain these aesthetic treatment goals and most often requires volume replacement. This volume enhancement is paramount to restoring and maintaining youthfulness. The decision to choose a specific option of volume replacement is typically based on the experience and training of the physician and their personal bias.

Current volume enhancement therapeutic options include: 1. silastic facial implants (temporal, tear trough, malar, submalar, combined midface, nasal, premaxillary, lip, chin and mandible angle), 2. facial autologous fat grafting with platelet rich plasma and/or autologous stem cell placement, 3. bone, or other biologic tissue transfers, with or without osteotomies and bony advancement, and 4. dermal filler placement (temporary and long-term fillers).

The chemical substances making up temporary dermal fillers include: hyaluronic acid (HLA), calcium hydroxylapatite (CaHA), and poly-lactic acid (PLLA). The long-term filler is suspended polymethylmethacrylate (PMMA) microspheres in a bovine collagen gel, known as Bellafill. Most dermal fillers should be termed subcutaneous fillers, since they are injected subcutaneously as opposed to into the dermis of the skin.\textsuperscript{4} The amount
of volume deficiency in a specific facial area may affect the recommendation for the optimal technique to treat the deficiency.

ART was approved in 2006 by the Food & Drug Administration (FDA) for the correction of facial wrinkles by volume replacement \(^5\) and for the correction of moderate to severe, atrophic, distensible facial acne scar on the cheek in patients over the age of 21 years in 2014. \(^6\) It has been proven to be safe and effective through 5 years for nasolabial fold correction in the longest and largest prospective dermal filler study ever compiled. \(^7\)

In the 5-year post-approval study, no treatment-related serious adverse events from ART were noted. The general adverse event profile was similar to prior nasolabial fold (NLF) studies. \(^7\) Combining patients across the four ART studies, 1,794 patients have been treated with a granuloma rate of 1.2%. \(^6,7,8,9\) In the 5-year post-approval study, granulomas occurred infrequently (1.7%), the majority were mild to moderate in severity and the ongoing granuloma rate at the end of the study was <1%. \(^7\)

There were 17 patients in these studies that had admitted to having one of the substances exclusion criteria related to allergies to the components. \(^6,7,8,9\) In Canada, a skin test prior to injecting ART is optional. In the United States, the FDA mandates the manufacturer to state to physicians that a skin test is required. \(^8\) The skin test is postulated to identify patients who may be allergic to lidocaine and/or bovine collagen present in ART.

The third generation of PMMA spheres is the only formulation ever available for use in the United States. They have a greater uniformity of size and shape, a smoother surface, a lower rate of clumping with the improved suspension medium, and less granuloma formation. \(^10\)
The proposed mechanism of action of the PMMA microspheres is that they create a matrix that supports endogenous human collagen synthesis and long-term residence in soft tissues. The collagen matrix and blood vessels form around the PMMA microspheres as early as one to four months post-injection (Figure 1).\textsuperscript{11} Human histology studies show that the bovine collagen is resorbed by 3 months with evidence of new collagen growth as early as 1 month.\textsuperscript{11} A study revealed anywhere between 50% to 100% of the bovine collagen gel is replaced by endogenous human host collagen.\textsuperscript{12}

Injectors may have a reluctance to using a permanent filler like ART (Table 2).

Material and Methods

Patient History

Patients presenting for facial rejuvenation complete a detailed medical and surgical history, including allergies to both lidocaine and red meat. Previous facial treatments of dermal fillers are queried regarding the adverse reactions, type, amount and anatomical sites injected.

Aesthetic Consultation

Patients convey their aesthetic concerns. The most important bothersome aesthetic issues are reviewed first, continuing until all of their concerns are identified. After receiving patient permission, a comprehensive facial analysis is undertaken. A narrative details volume replacement alternative treatments for correction of these identified aesthetic issues.

Comprehensive Facial Analysis

The facial analysis is the key to identifying attractive anatomical findings as well as the anatomic issues detracting from the patient’s optimal cosmetic appearance. Systematic
examination of each facial anatomical site examines the full thickness or layers of the face, including bony, soft tissue and skin structures. Each cosmetic issue is identified and the treatment options for each specific cosmetic concern reviewed with the patient. The patient, along with physicians input, determines the final treatment option.

The facial anatomic areas where volume deficiencies are commonly discovered are:

A. Upper face-
   1. temporal fossa
   2. Infra-brow or upper eyelid area
   3. glabellar vertical wrinkles
   4. immediate suprabrow area (to produce brow lift)

B. Mid-face-
   5. tear trough
   6. malar eminence
   7. submalar area
   8. nasojugal groove
   9. nasolabial folds
   10. nasal dorsum (common in Asian population, and some Afro-Americans)
   11. pre-maxilla/pyriform aperture (common in Asian population)
   12. upper lip (vermillion and bulk of lip) and philtrum

C. Lower face-
   13. lower lip (vermillion and bulk of lip)
   14. oral commissure creases
   15. supramental crease
16. chin
17. pre-jowl sulcus (mesolabial folds or marionette lines)
18. posterior and angle of mandible

Volume Replacement Alternatives

Facial volume replacement alternatives are discussed in detail, including silastic implants, biological tissues highlighting fat transfer, as well as temporary and permanent dermal fillers. The best clinical practices for each, their benefits, limitations, and potential complications are reviewed.

Most temporary fillers are made of hyaluronic acid. The HLA filler recommended was Restylane Lyft, previously called Perlane (PER), manufactured by Galderma (Lausanne, Switzerland). A direct comparison of PER to Juvederm, in an in-vitro study, revealed PER kept its form much longer. Rheological studies have shown greater elasticity, total resistance to deformation, and amount of elasticity for Restylane and PER compared to other hyaluronic acid fillers.\(^{13,14}\)

Indications for Dermal Filler Treatment

The facial analysis determines the locations for volume replacement with the following main aesthetic treatment goals:

1. restoring facial balance and symmetry
2. filling areas of volume loss
3. enhancing or augmenting areas that are flat or hypoplastic.

Dermal Filler Materials

ART contains atellocollagen (bovine) 3.5%, phosphate buffer 2.7%, sodium chloride 0.9%, lidocaine hydrochloride 0.3% and water 92.6% with a pH between 6.9 to 7.0.\(^8\)
manufacturer combines 6 ml (23%) of PMMA with 20 ml (77%) of bovine collagen gel together and fills syringes to about 0.85 ml. PER\textsubscript{1} is composed of stabilized hyaluronic acid, 20 mg/ml in phosphate buffered saline and 0.3% lidocaine hydrochloride at a pH of 7.0 with syringes filled to 1.0 ml.\textsuperscript{15}

A minor amount of other hyaluronic acid fillers were used, including Juvederm, Voluma and Restylane Silk. Some patients requested Radiesse, a calcium hydroxylapatite filler with limited collagen-stimulating activity.

Dermal Filler Specific Anatomical Site Placement

The Federal Food, Drug, and Cosmetic Act allows any FDA-approved product to be administered for any condition within a doctor–patient relationship. The indications not submitted or receiving FDA approval are referred to as “off-label use”. To optimize facial comprehensive volume replacement, one uses fillers in the FDA-approved anatomical sites for ART and PER\textsubscript{1} as well as off-label locations. The FDA approved indications for use (IFU)\textsuperscript{8} of ART was for the correction of nasolabial folds (NLF)\textsuperscript{5} and correction of moderate to severe, atrophic, distensible facial acne scar on the cheeks.\textsuperscript{6}

ART is an excellent filler material to achieve minimally invasive, lasting improvement of facial wrinkles and furrows, acne scars other soft tissue contour deficiencies and pan-facial volume deficiencies (Figure 2, 3, 4).\textsuperscript{16} ART can be injected in all areas of the face, excluding the bulk or red vermillion of the upper and lower lips as noted above. Some patients who underwent lip silastic implant placement, requested a permanent enhancement of the vermillion border, where ART was injected (Figure 5). Naturally occurring nasal irregularities or defects, especially those as a result of rhinoplasty surgery, can be safely and effectively treated with small amounts of ART (Figure 6).\textsuperscript{16}
Brow lifting created by placing ART directly in the superior aspect of the brow hair or in the temporal/forehead hairline.

The indications for use (IFU)\textsuperscript{15} of the PER\textsubscript{i} is for placement in the deep dermis to superficial subcutis for the correction of moderate to severe facial folds and wrinkles, such as the nasolabial folds (NLF). The technique places the filler in the immediate subdermal space to the amount to ameliorate the wrinkle or fold optimally. It is also indicated for subcutaneous to supraperiosteal implantation for cheek augmentation and correction of age-related midface contour deficiencies in patients over the age of 21. RES\textsubscript{i} and PER\textsubscript{i} are also indicated for submucosal implantation for lip augmentation in patients over the age of 21.\textsuperscript{15} In clinical use, the HLA filler is used anywhere in the face that volume replacement is desired.

In summary, patients requesting a temporary solution were recommended PER\textsubscript{i}. Those requesting a permanent solution were recommended ART, the only exception was lip augmentation. Since ART placement is contraindicated in the bulk of the lip, a soft silastic implants known as the Perma Lip (Surgisil, Inc., Plano, TX) was recommended.\textsuperscript{17}

Determining Amount of Filler for Placement

We have an educated guess concerning the number of syringes of a filler to correct the areas of deficiency based on facial proportions and aesthetics.\textsuperscript{18} Since people have different skin elasticity, some take more volume to produce an appreciable change.
To minimize a risk of over-correction of fillers, especially ART, the number of syringes for facial rejuvenation initially injected was 80% of the total estimated volume for full correction. This lowers the chance of excess injection in a specific anatomical area.

Standard Dermal Filler Injection Technique

Specific anatomical areas to be treated are confirmed with the patient prior to treatment. A custom small ice pack is applied to the first area to be treated for at least ten seconds for both the anesthetic and hemostatic effects. Alcohol swabs clean the treatment area. The tissue plane of filler placement is in the immediate subdermal space, except for the tear trough area, where the placement is below the orbicularis oculi muscle. The area is massaged to resolve any palpable or visual skin contour irregularities using Arnica Montana as a lubricant and anti-bruising gel. The patient is shown a mirror after each anatomical site and after the completed injection for their input on the degree of preferred correction and smoothness. Topical anesthetic cream and trigeminal sensory nerve blocks were performed upon request.

Microcannula versus Needle Injection Techniques

Patient administration of dermal fillers used either the manufacturers supplied needles (ART 26 G, 5/8 inch, PERl 29 G, ½ inch) or microcannulas. Different microcannula manufacturers were used including Magic Needle, TSK, and Dermasculpt. The most common size microcannula used clinically was a 25 G, 1 ½ inch length for ART and 25 G and 27 G, 1 ½ inch for PERl.

Dermal Filler Additives

Dermal fillers are manufactured containing lidocaine hydrochloride as the local anesthetic to decrease injection discomfort. The epinephrine component was added in
hopes of counteracting the potential vasodilatory effects of the lidocaine\textsuperscript{19,20} with the vasoconstriction properties of the epinephrine.\textsuperscript{21} When combining a dermal filler with lidocaine with epinephrine, additional buffer of sodium bicarbonate 8.4% was added for a more homeostatic solution (pH between 7 and 7.4).

Results:

There were 1,513 patients treated from 2009 through 2015, composed of 83% woman and 17% men with a mean of 51 years of age, SD ± 14.7. All patients were followed for at least two weeks post-injection, however, most patients have been followed for more than six months.

All patients were verbally queried concerning their opinion of the aesthetic outcome during each follow-up visit and if they were satisfied with the outcome. Fifteen patients (<1%) admitted to being unhappy with the final outcome, most of these patients received a fraction of the recommended amount of filler volume replacement. Some dissatisfied patients complained of significant bruising as a result of the injection. Three experienced excess ART placement.

Throughout this time period, there was a total of 2,875 ART syringes injected, a mean of 1.9 number of syringes per treatment with 2.9 months between treatment sessions. The total number of syringes used per patient were as follows: 0-5 44%, 6-10 33%, 11-15 11%, ≥16 11%. Over-weight and younger patients typically needed less volume than those that were thinner and older. A study revealed anywhere between 50% to 100% of the bovine collagen gel is replaced by endogenous human host collagen.\textsuperscript{12} The author has observed about 80% of the initial volume injected persists long-term.
In 2015, ART injections were as follows: there was a total of 301 treatment sessions, the number of syringes used totaled 801, and there were 2.7 syringes/treatment session. In those receiving ART fillers, 389 PERL syringes were injected in 321 treatment sessions with 1.2 syringes injected/treatment. About two-third (67.7%) of patients undergoing ART injection received an HLA filler placement. A minor amount of Radiesse and other hyaluronic acid fillers to include Juvéderm Ultra XC, Voluma and Restylane Silk were used per patient request.

Adverse Effects

In 1,513 patients treated clinically with 2,875 ART syringes injected between 2007-2015, no patients were observed to have an allergic reaction. In the first six months of 2007, skin testing was done with no positive reactions. Thereafter, injections were performed without a skin test if the patient denied any lidocaine or red meat allergies.

There were three patients (0.10%) identified with a localized area of firm tissue inside the area of ART injection. This tissue reaction was possibly a result of granuloma formation, although no biopsies were performed for confirmation. The treatment was serial triamcinolone (Kenalog 10, Apotex, Toronto, Canada) injections with resolution of the palpable areas in all cases. Three patients had unilateral excess filler injected (0.2%), two in the tear trough area and one in the prejowl sulcus. One patient elected surgical excision using a transconjunctival approach with about a 2-3 mm pearl of soft tissue removed at the medial fat pad area. One had incision at inferior mandibular border with excision by another surgeon. The third patient initially underwent lower blepharoplasty along with ART filler injection to the tear trough. There was excess ART noted in one tear trough.
She underwent one triamcinolone injection and was being followed clinically awaiting further correction procedures.

Three patients treated with PER\textsubscript{1} complained of persistent fullness more than 3 weeks post-injection without resolution with manual massage. The suspected excess HLA filler was treated with recombinant hyaluronidase, known as Hylenex (Halozyme Therapeutics, Inc, San Diego, CA) with resolution of the area of fullness.

Examining administration techniques revealed that within five minutes of ART and PER\textsubscript{1} injection, there was the onset of swelling and erythema to the skin. This reaction was suspected to be due to minor placement trauma and the lidocaine vasodilation effect. The swelling and erythema was less with the diluent lidocaine with epinephrine and bicarbonate compared to the filler alone. Assessment of site correction was determined in this five-minute time-frame to ensure placement accuracy.

The area producing the most swelling post-injection was the tear trough area. Patients elected to minimize this swelling by accepting a prescription for a methylprednisolone corticosteroid taper. In the authors experience, the steroid treatment was chosen after patient education in about 15-20\% of tear trough injected patients and in those treated with more than 5 syringes throughout the face.

No patients experienced vascular occlusion, blindness or hypertrophic scar formation.

Discussion:

The ultimate goal of aesthetic practitioners is a happy and satisfied client. Some practitioners care for cosmetic patients by only treating the issues and method identified by the patient.
The author believes this methodology limits the patient’s final aesthetic appearance. It’s preferred to implement an educated comprehensive facial rejuvenation protocol by understanding the ideals of beauty, identifying specific patient anatomic aesthetic issues through a thorough facial analysis, presenting a detailed, and mutually agreed upon treatment plan. Finally, carrying out the treatment plan with an optimal cosmetic outcome, while limiting adverse effects.

Facial proportions and facial balance is a key to perceived beauty.\textsuperscript{18} The specific facial features producing beauty can be learned and implanted into a rejuvenation protocol (Table 1). A comprehensive periorbital rejuvenation protocol highlighting blepharoplasty surgery, analogous to this treatment plan, revealed high patient satisfaction (99%).\textsuperscript{22}

The consultation methodology herein achieved the following goals: 1. educated the patient to all the therapeutic options available for each anatomical aesthetic issue identified, including the benefits and limitations of each, 2. assist patients in narrowing the choice of procedure given their specific anatomical findings, and 3. having the patient request the specific procedure they desire after evaluating all the consultation information. Some patients, for either financial reasons or personal choice, did not undergo all the recommended procedures presented to attain the optimal aesthetic appearance.

This clinical study revealed a high patient satisfaction rate from volume replacement combining ART and PER\textsubscript{1} with advanced injection techniques to increase precision placement, while minimizing adverse effects. Precise placement was related to the injectors knowledge of facial anatomy, and gentle, continual pressure during injection
delivering a predictable metered amount of filler to increase the incidence of a smooth skin contour.

Additionally, the combination of a smaller lumen microcannula along with a diluent of lidocaine with epinephrine and bicarbonate in HLA fillers thins the filler solution further eases injection pressure without optimizing accuracy. This hydration also lowers the risk of hydrostatic effect and tissue ischemia in the tissue. ART may be best injected after a pre-injection of a lidocaine with epinephrine and bicarbonate solution followed by the aesthetic ART unaltered syringe.

Microcannulas minimize the risk of injecting fillers too superficially. HLA fillers can cause skin discoloration and irregularities, while ART injected too superficially can result in hypertrophic scar formation. Microcannulas along with the lidocaine with epinephrine and bicarbonate diluent lowered adverse effects of discomfort, ecchymoses, swelling, vascular injury and the hydrostatic effect of the humectant HLA fillers in our clinical subjects. Others have shown the benefits using microcannulas in HLA filler administration. Colleagues in the top 1% of ART injectors in the US have agreed that more than one-half a syringe of ART to the tear trough may elicit moderate swelling (direct communication). The tear trough swelling is most likely due to external lymphatic vessel compression.

In summary, ART combined with PER are valuable components to a comprehensive facial rejuvenation treatment strategy with a low incidence of complications.

Conflict of Interest:

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.
References:


11. Lemperle G, Morhenn VB, Charrier U. Human Histology and Persistence of Various


15. Restylane Lyft® [Instructions for Use]. Lausanne, Switzerland: Galderma. 2015.


21. Raster JF, Chow JM. Vasoconstrictive effects of cocaine and lidocaine with


Table 1 Optimal Facial Aesthetic Features

1. facial proportion, symmetry and balance
2. appropriate forehead height and aesthetic brow shape
3. lack of eyelid dermatochalasia
4. high cheek bones
5. appropriate nasal size and shape
6. full, sensual lips
7. straight, white teeth
8. straight mandibular line
9. acute cervicomental angle
10. a smooth skin contour without wrinkles or blemishes.

Table 2  Reluctance to Implement Permanent Dermal Filler

1. fear of the long-term effects of PMMA microspheres in soft tissues
2. risk of granuloma formation
3. the concern of treating excess filler placement
4. theoretical less future filler use with physician loss of revenue.

Figure 1
Diagram of donor site A. Immediately post-injection B. Four weeks post-injection
(Courtesy of Suneva Medical, Inc, 2016). Human collagen formation (off-white lines) produced by fibroblasts (blue cells) around each microsphere (large grey spheres) with microvascularization formation (red vessels).

Figure 2
49 yo woman with facial volume loss and acne scarring corrected by Carbon dioxide laser skin resurfacing (DEKA, Smartxide CO2 at 24 Watts, 1400 milliseconds of dwell time, and 400 micron spacing) along with 4 syringes of Bellafill to tear trough, midface and pre-jowl sulcus A. B. Before C. D. After (2 months)

Figure 3
63 yo woman with facial volume loss requested rejuvenation. She was treated with 14 syringes of Bellafill to tear trough, nasolabial folds, submalar & prejowl sulcus A. B. C. Before D. E. F. After (8 months)

Figure 4

49 yo Asian woman who requests permanent facial filler volume replacement. She underwent 4 Bellafill syringes to tear trough, nasojugal groove and mesolabial fold (pre-jowl sulcus). A. B. C. D. Before E. F. G. H. After (18 months)

Figure 5

26 yo woman requesting lip augmentation. A. Before B. After PermaLip Implant C. After Implant & 1 syringe Bellafill to vermillion border

Figure 6

29 yo man with nasal irregularity post rhinoplasty repaired with 1 Bellafill syringe A. Before B. After (3 months)
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