

Review Article

Fillers for aesthetics on the face – Newer perspectives

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Received : 02-May-2021

Accepted : 05-May-2021

Published : 17-May-2021

DOI

10.25259/CSDM_6_2021

Quick Response Code:



ABSTRACT

Dermal fillers are a cornerstone of the aesthetic treatments of the face. They have evolved over many aspects since their initial use. Facial fillers are not just used for anti-aging to restore volume, but are now also used for contouring, enhancing facial features, and changing the emotional attributes of the face. Newer techniques and approaches have been proposed for greater predictability of results and minimum complications. Newer composite filler materials and a resurgence of older materials have taken place with better understanding of the science behind them. With more use of facial fillers comes the reporting of newer complications with recommendations and guidelines to avoid them. A new perspective is seen in guidelines for their use in the COVID-19 pandemic. This article is a review of the insight into the latest perspectives of facial fillers for aesthetic indications.

Keywords: Derma fillers, Aesthetics, New advances, Techniques, Filler complications

INTRODUCTION

The use of minimally invasive techniques to prevent and counter signs of aging has been in increasing demand in the last decade. Youthfulness is synonymous with a well-balanced, contoured face, with adequate volume and good skin elasticity.^[1] Dermal fillers are one such modality to restore youthfulness and their use is the second most common cosmetic procedure undertaken worldwide.^[2]

Just as the concepts of aging are evolving, so is the understanding and use of dermal fillers.^[3]

The cosmetic use of dermal fillers is to restore the volume of the aged face for contouring and lifting to an extent.^[4] They are now regarded as smart implants and are used as scaffolds in regenerative medicine.^[5] Their use in medical aesthetics is being increasingly explored.^[6]

As cadaveric studies give an in-depth knowledge of the facial anatomy, safe injection practice thus shifts with each published report, as does the injecting technique.

Newer insights into the complications with greater reporting, newer methods adopted to increase the clinical longevity, safer materials with biostimulatory properties, standardization of techniques for predictable clinical outcomes all focus on the latest science that backs dermal fillers. This article focuses on the newer perspectives of dermal fillers used for cosmetic indications on the face.

Newer filler materials and filler-tissue interactions

Ever since the use and then disuse of paraffin and then silicone for dermal filling, the quest for materials and substances used as ideal filling agents is on. Hyaluronic acid (HA) fillers are the

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most widely used as they are relatively inert, have good tissue integration, and have a neutralizing substance in the enzyme hyaluronidase in case of an adverse event. Many modifications with this material are being explored.

Fillers which not only restore the three-dimensional attributes of the face but also stimulate fibroblasts to induce collagenesis and act as reactivators of cellular bioprocesses to improve the skin elasticity, turgor and firmness as well, have now been introduced.

Technological improvements to produce triphasic fillers and composite fillers such as those with an HA matrix with calcium microspheres and HA-hydroxyapatite are being developed to ensure longer volumetric maintenance and better biointegration to increase the longevity of fillers.^[7-9] This is also achieved by combining HA with polynucleotide.^[8] Composite hydrogel fillers also reportedly promote collagen and elastic fibre formation.^[9]

There is now a renewed interest in calcium hydroxylapatite (CaHA), and a consensus recommendation has proposed its use as a facial filler and biostimulatory agent in a hyperdiluted form.^[10] Interestingly the filler has found a partial antidote in sodium thiosulfate, which is shown to decrease its volume. Histological, ex-vivo micro computed tomography (CT) and in-vivo CT have proved this. Necrosis and hemorrhages however, were noticed with its use.^[11]

A study comparing the in-vitro effects of HA and poly-L-lactic acid (PLLA) fillers showed a negative impact of PLLA on the viability of fibroblasts causing inflammation and greater complications. Cultures exposed to PLLA exhibited a significant reduction in both cell proliferation and viability compared to control at 24, 48, and 72 hours. The same study included an in-vivo analysis and found significantly higher amounts of collagen 1 content in the HA group compared to the PLLA group on Western Blot analysis.^[12]

As controlled fibrosis cannot be achieved, and the time and duration of fibrosis cannot be predicted, the author proposes that long-term follow-up studies may be needed to know the exact tissue interaction.

Incorporation of lidocaine 0.3% in fillers has reduced the pain associated with the procedure. Its addition showed no statistically significant pharmacokinetic alterations.^[13] Tweaking the fillers by diluting them with saline or anesthetic so as to reduce lumpiness and reduce viscosity has been in practice by a large number of injectors.^[14,15]

Recently, polyethylene glycol diglycidyl ether (PEGDE) as a crosslinker for HA has been used instead of 1,4 butanediol diglycidyl ether (BDDE) to change the physiochemical properties of the filler to improve longevity.^[16]

Advancements in the facial approach and techniques

Performing reliable techniques which standardize the procedure and ensure predictable clinical results are now being focused upon in this section.

Injection techniques have moved away from a two to a three-dimensional global approach without just chasing lines.^[17] Full-face approach is now what injectors follow for improved results. Planning involves keeping the science of beauty and facial shape in mind too, not just restoring or enhancing. The AB “anatomy of beauty” face technique is one such technique which keeps the facial beauty central to filler injections on the face. It comprises of two steps, the AB structure based on the facial shape which improves the contours and AB refinement aimed to blend and smooth the injected areas.^[18]

The Sebban Technique One-point (STOP) Facial Aging Method™ is a protocol for facial rejuvenation using HA fillers, a single entry point and a dual plane of injection combining the deep one-point (DOP) and superficial one-point (SOP) techniques targeting the deep and superficial planes, respectively [Figure 1].^[19]

Mauricio de Maio published the medical codes (MD)™ recently, which provide a uniform symbolic language and reduce the variability in the approach for facial filler injections. The MD codes divide the face into units and subunits and suggest an algorithm for the dose, delivery system, depth of injection, technique, and also alerts about the danger zones in these areas.^[9]

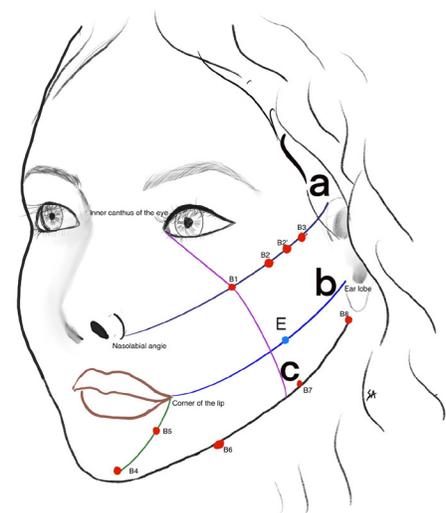


Figure 1: Deep One Point Technique: a. Axis of Rejuvenation, b. Midjugal Line, c. Oblique Line; B1. Intersection of a & c, B2. Projection of lateral cantos on the rejuvenation line, B3. On zygomatic branch 1 cm away from hair line, B4. on mandibular symphysis, B5. On chin hollow, B6. On mandibular notch, B7. On mandibular branch, B8. On mandibular angle, E. (Sebban S.19).

Newer techniques, approaches, and recommendations are continuously being proposed for different anatomical areas. One such recommendation for the treatment of tear trough with HA fillers suggests that both cannula and needle can be used, but the former is safer. Patients should be assessed for myocutaneous laxity, hyperpigmentation, fluid retention, bags, and grade of deformity to choose an ideal patient. The approach involves the cannula advanced through one of the two entry points and the needle through two entry points [Figure 2].^[20]

A safe step-by-step phi technique has been proposed for lip HA filler injections. Marking on the lips is done using a phi caliper. From the outer corner of the right side of the upper lip to the edge of the right philtrum ridge is the full length of the caliper and three injection points are marked [Figure 3]. The same is repeated in each quadrant. When restoring volume, injections are performed through the vermilion border at an angle of 30 degrees about 2.5 mm deep as small boluses deposited in a retrograde linear technique. The needle can be bent at 2.5 mm. To shape the lips, injection by a retrograde linear threading technique are recommended taking care to avoid the white roll.^[21] Another report highlighted the use of a 4 mm, 30 gauge needle for safe lip filler injections.^[22]

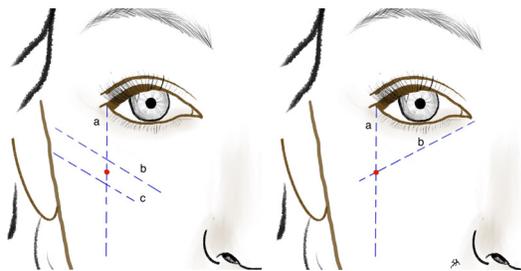


Figure 2: Options for entry point location to correct tear trough deformity. Left. On a (vertical line from outer eye canthus) at the midpoint between b & c (limiting boundaries of zygomatic bone); Right. Intersection of a (vertical line from outer eye canthus) and line along the nasojugal fold. (Anido et al.20).

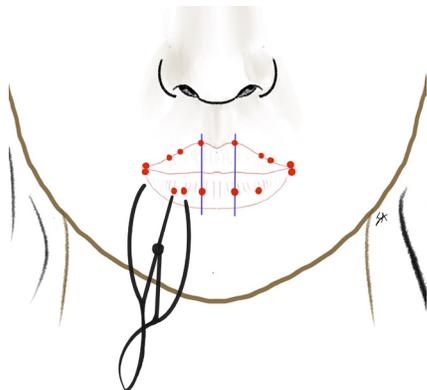


Figure 3: Injection points for lip augmentation using the Phi technique (Keramidas et al.21).

The nasolabial fold is being addressed in multiple layers with fillers as it is a challenging area to treat due to dense fascia with a thin superficial fatty layer on the inside and a thick one outside. Injections which are usually performed inside don't give satisfactory results and boluses have the disadvantage of spreading.^[23]

Fillers are now used to modulate to change the emotional attributes of a face and do away with negative emotions such as sadness, tiredness, etc. making the approach more holistic.^[17] Advanced techniques such as perpendicular intradermal microboluses for skin boosting, intraoral approach for the lip, and linear periosteal threading to contour bones are now being employed.^[24] They are also used to cause myomodulation for a balanced facial appearance via a mechanical action: facilitating their action by injecting deep to them or decreasing their contraction by injecting superficial to them.^[25,26]

Various management guidelines have been published regarding methods to reduce pain during injections such as the use of topical anesthetic creams occluded with vinyl wraps for 40 minutes, use of entry point anesthesia for cannulas, or using nerve blocks.^[27]

Safer injection practice with regard to respecting the vascularity and causing minimal tissue trauma, warrant the use of blunt cannula over needles especially in high-risk areas. Slower injections using small boluses and smaller gauge needles are employed for safety.^[24,28] Aspiration, positive or negative, cannot be relied upon as an accurate method of ensuring a safe injection, according to Goodman et al. who concluded that one should always assume that one is in a vessel and all other precautions should be taken to prevent a vascular event.^[29] However, the author recommends it is advisable while using a needle to aspirate and wait to a count of 10 before starting to inject. Stop the injection in case of a positive aspiration.

Newer reported complications of facial fillers

With an increased use of fillers for aesthetic indications on the face, newer reported complications are coming to light. This is also because of better reporting systems in place now.

Herpes zoster has been reported as a differential diagnosis for ischemia after facial filler injections.^[30] A painful facial dermatomal erythema in the initial stages soon after the filler injection may mimic a vascular event. Turkmani et al reported a series of 14 cases of delayed hypersensitivity reactions to HA fillers following an influenza-like illness. These may be infectious or immune-mediated in origin.^[31] There was an interesting report of alopecia secondary to HA filler embolization injected in the superciliary arch to correct upper eyelid ptosis.^[32] The first case of lymphangioma formation four years after lip filler injection was reported recently.

The patient presented with a two-year history of linear swellings on the upper lip which were excised and marker studies proved it to be of lympho-vascular origin.^[33]

An expert group consensus report highlighted the importance of pre and post care, assessment, knowledge of anatomy, treatment plan, preparation of the treatment area, anesthesia to be used, and documentation to avoid complications with dermal fillers.^[34] These gold standards hold good even now. Management guidelines of a few facial filler complications have also been published more recently. It is recommended that managing abscesses as a complication of soft tissue HA fillers involves draining, the use of combination of amoxiclav and a macrolide/quinolone for at least two weeks with microbiology support is the current recommendation. The use of hyaluronidase is encouraged.^[35] Non-responsive delayed nodules may also be treated with systemic steroids after a course of antibiotics.^[36]

Handheld ultrasound doppler devices are now being used as complimentary tools to a thorough anatomical knowledge to detect vascular episodes associated with fillers.^[37] High-frequency ultrasonography is being used to diagnose palpable nodules after facial filler injections to distinguish between filler deposits, granulomas, or inflammatory nodules.^[37,38]

With the increased use of CaHA fillers, we are getting to see newer complications associated with it. Facial cellulitis and Ludwig's angina have been reported in a case report while using it for periorbital augmentation, jaw line contouring, and facial lifting.^[39] CaHA non-granulomatous nodules were treated successfully with intralesional combined solution of 5FU, triamcinolone, and dexamethasone.^[40]

Holistic approach with fillers

Combining facial fillers with other modalities of treatment for a full facial approach are now increasingly being done.^[41] A specific sequence in their use has been recommended as per the region of the face being treated.^[42] Cartier et al. concluded that repeated full-face combination treatments with abobotulinum A toxin, HA fillers and skin boosters led to higher levels of aesthetic improvement and subject satisfaction than with monotherapy.^[43] The HARMONY study concluded the rationale and benefits of using multimodality treatments for an overall well-being and improvement of self-esteem of the patient when combined with facial enhancement with fillers.^[44]

Gender and ethnic demography

With the metrosexual male being an important demographic in aesthetic dermatology now, focus is pinned on respecting male aesthetics. It is important not to feminize a male face and to maintain a balance.^[45] The ethnicity of a patient which dictates facial features must also be respected while

injecting.^[46,47] An expert group for Chinese injectors recommended that concept of beauty should be kept in mind depending on the race and region and filler techniques should be accordingly used.^[27,48]

Consultation for fillers

The approach to the aesthetic patient has changed over the years and more time is now invested in the first consultation for filler treatment. There is a difference between the "wants" and the "needs" of the patient. Treatments should be phased out. Combination treatments need to be discussed for a full-face approach. The importance of maintaining balance, harmony, and converting negative emotional attributes to positive ones should be discussed.^[49] This approach leads to greater physician-patient satisfaction.

A recent study concluded that approximately 88% of patients who sought consultation for non-surgical facial aesthetic procedures proceeded with the treatment. Majority were females above 40 years. Notable was the high frequency of rejuvenation rather than correction as a treatment goal.^[50]

Precautions for filler injections during the COVID-19 pandemic

With the change in medical homeostasis, the COVID-19 pandemic has brought with it the need for introducing guidelines for safer filler practices. The Special Interest Group on Aesthetics of the Indian Association of Dermatologists, Venereologists, and Leprologists has proposed that advanced protection should be undertaken with wearing of goggles, a double pair of gloves, face shield, N95 respirator mask, gown, head, and shoe covers by the doctor and healthcare staff.^[51] For procedures around nose and perioral area, use of povidone iodine to coat oral and nasal mucosa is recommended as it has shown to be viricidal to SARS-CoV-2 for a period of 3 hours.^[52] Disposal of needles using a needle destroyer should be done immediately post-procedure. A suitable skin dressing to be used post procedure to seal entry ports made for cannula insertion for 48 hours followed by an antibiotic cream for another two days.

A recent flutter in the aesthetic world of fillers when four patients were reported to have delayed hypersensitivity reaction (DHR) to HA fillers post COVID-19 vaccination. Two patients were reported to have had vaccination ranging from 2.5 years to two weeks after the filler injections. All cases resolved completely with hyaluronidase, oral steroids, and antihistamines.^[53] DHR to fillers have been reported with other vaccinations as well with an incidence of 1 : 5,00,000 to 10,00,000 doses. The global incidence rate is 0.8% with HA fillers. The DHRs develop as filler particles act as adjuvants rather than direct T-cell activators.^[54] The current American Society for Dermatologic Surgery (ASDS)

guidelines categorically state that those patients who have taken dermal fillers in the past, should not be discouraged from taking the vaccine as the event of a DHR is rare and temporary.^[55]

ACKNOWLEDGEMENTS

Nil.

Declaration of patient consent

Patient's consent not required as there are no patients in this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Arora G. Fillers for aesthetics on the face - Newer perspectives. *Cosmoderma* 2021;1:6.