Polycaprolactone facial volume restoration of a 46-year-old Asian women: A case report

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Summary
A 46-year-old Asian women was treated with a next-generation bioresorbable biostimulatory polycaprolactone (PCL)-based dermal filler to restore facial volume loss. Before- and after (12 weeks of follow-up)-treatment photographs were analyzed and compared. In addition, before- and after-treatment contour images were recorded using the VectraXT 3D imaging system (Canfield Scientific, Inc.). Improvement of facial volume in multiple tissue layers was observed at 4 and 12 weeks of follow-up. Total facial rejuvenation to correct descending soft tissue with a PCL-based dermal filler was achieved through volume restoration in multiple tissue layers of the face.

KEYWORDS
neocollagenesis, PCL, polycaprolactone, volumizing

1 | INTRODUCTION

Volume loss has been recognized as a major cause of facial aging, and it occurs in multiple anatomical structures. By adequately volumizing multiple layers of those anatomical structures by dermal filler injection, it is possible to achieve treatment goals that are more satisfying for the patients than correcting lines and folds in the face alone. However, no two faces age identically, and there is no one algorithm for the amount to be volumized in each face. Correlating the observed and subjective aging signs with the possible relevant anatomical compartments of volume loss is the key to a successful and satisfactory treatment outcome.

A polycaprolactone (PCL)-based dermal filler has been introduced to the aesthetic market in 2010, representing a new class of biostimulatory dermal fillers with microspheres that are smooth and spherical-shaped for optimal biocompatibility. The PCL-based dermal filler is composed of 30% synthetic PCL microspheres suspended in a 70% aqueous carboxymethylcellulose (CMC) gel carrier, and its safety and efficacy has already been shown in several studies. Furthermore, it not only acts as a filler with immediate volumizing effects, but also stimulates the growth of new collagen (neocollagenesis) replacing the volume loss. In this case study, the PCL-based dermal filler was used to treat the descending soft tissue and contour defects of a 46-year-old Asian women by total facial volume restoration in multiple tissue layers. The injection techniques and concepts were derived from the recommendations of use for this product and modified from the author’s previous experience of using the injectable poly-L-lactic acid (PLLA).

2 | MATERIALS AND METHODS

A 46-year-old women was treated 2 years before the current treatment by the insertion of polydioxanone threads. The result from the polydioxanone threads was unsatisfying and did not correct the folds and the descending soft tissue in her face as desired. She therefore expressed her preference for a biostimulatory product with an immediate volumizing effect that lasts longer than 1 year. Considering the needs of the patient and the volumizing characteristics of the PCL-based dermal filler, this became the product of choice for her treatment. Ten syringes (1 mL each) of the PCL-based dermal filler were used (Ellanse©; AQTIS Medical, Utrecht, the Netherlands).
syringe was premixed with 0.2 mL 2% lidocaine before use. The product was placed into the supraperiosteal (SP) plane by vertical punctures with a 27G 1" needle (Figure 1). The amount injected was determined by the surface areas to be treated using 0.2 mL/cm². For superficial fat (SF) and deep fat (DF) placement, a retrograde fanning technique was performed using 25G, 40 mm cannulas (Figure 1). The amount injected was also determined by the surface areas to be treated, with each linear thread containing 0.1 mL/cm.

The treatment was carried out in the following sequence:

Upper face: right glabella (SP); right temple (SP); right brow (DF; retro-orbicularis oculi fat, ROOF); right temple (DF; suprazygomatic temporal fat and deep to temporalis fascia).

Midface: right zygoma and zygomatic arch (SP); right premaxillary space and canine fossa (SP); right deep fat compartments of the midface (DF; lateral suborbicularis oculi fat (SOOF), medial SOOF, buccal extension of buccal fat, and suborbicularis oculi fat (DMCF)).

Lower face: preauricular area and mandibular angle (SF; temporal lateral-cheek fat compartment); chin (SP); chin (DF; oral commissure (DF). The left side of the face was treated by the same sequence in similar anatomical structures, but differed in amount due to volume loss differences.

The forehead (SP) and the nasal bridge (SP) were treated to camouflage the transition zone between the treated and the untreated area to produce a more beautified contour. As the treatment goal of this patient is to correct descending fat and contour defects caused by volume loss in the deep fat compartments and the craniofacial platform, the therapeutic end point for each third of the face is to blanket the surface area to be treated, and a small extra amount of the product can be focally added by the same techniques to reach an ideal volumetric correction. A massage and molding of the product was performed post-treatment.

3 | RESULTS

Immediately after and 1 week post-treatment, mild swelling and edema of the face were observed, which resolved within 1 week without intervention. There was no significant bruising due to deep injections in relatively avascular anatomical structures with the use of cannulas. Figure 2(1) shows the pretreatment images of the 46-year-old women with several observed signs of facial aging (Figure 2(1)). Twelve weeks post-treatment, images demonstrated a

![Figure 1](image-url)
reverse triangular shape of the face, indicating more rejuvenated and beautified proportions (Figure 2[2]). In parallel, pretreatment contour images of the face were obtained with the Vectra®XT 3D imaging system (Canfield Scientific, Inc.) (Figure 3, week 0). The contour images recorded at 12 weeks post-treatment (Figure 3, week 12) demonstrated contour changes after three-dimensional volumization in multiple tissue layers with a change of facial shape from a rounded one to a reverse triangular one. The contour images showed changes in eyebrow spans and changes in the eye- brow and glabellar contours coupled with improvement of the drooping upper eyelids, all of which were in line with the effects after volume restoration in multiple layers of the temples, brows, and the glabella. A subtle contour change in the nasal dorsum revealed the result of volumization along the nasal dorsum that went well with the contour change of the glabella. The changes of anterior projections in the midface as well as the improvement of jowls were also well observed in the post-treatment contour images. The change of chin shape and contour change in the mandibular and submental areas indicated the results of volume restoration in the lower face.
4 | DISCUSSION

Loss of contour definitions, downward shifts of soft tissue, and flattening of anterior projections are common signs of aging caused by volume loss in the deep fat compartments and by bone remodeling in the process of facial aging. For volumes to be restored deep on the bony surface and in the deep fat compartments, fillers with high viscosity and elasticity are preferred to produce a good lifting effect. In this case report, a 46-year-old Asian women was treated with a next-generation bioresorbable biostimulatory polycaprolactone (PCL)-based dermal filler to correct descending fat compartments and contour defects caused by volume loss in the deep fat compartments and the craniofacial platform, and to maximize the result using 10 mL of the product distributed in small amounts in multiple levels of depth. Post-treatment facial images compared to pretreatment facial images revealed a more reverse triangular shaped and in proportion rejuvenated face with more widened temples and a more pointed chin, coupled with the improvement of a downward shift of soft tissue, which can be well observed in the contour images (gray-scale photographs in Figure 3) of the restored anterior projections in the frontal and 90-degree views. In the upper face, the images demonstrated more beautified eyebrow shapes and a better contour of the glabella, along with the vertically and horizontally lifting effects in the eyebrows and eyelids, which can be attributed to volumization in the ROOF. In the midface, a downward shift of the soft tissue observed as ptosis of deep fat compartments and jowls was corrected, coupled with a rejuvenated anterior projection after volume restoration in the premaxillary spaces and the deep fat compartment.
compartments. In the lower face, the images demonstrated improvement in the definition of the jawline, downward shift of the soft tissue, and a descent in submental fat. Chin projection and proportion also demonstrated significant improvement along with the improvement of melomental folds. Narrowing of the distance between the eyebrows and the shape of the nasal dorsum were observed after restoring the anterior projections in these areas.

The PCL microspheres of the product are homogeneously suspended in the CMC gel carrier. The gel carries a high viscosity and elasticity and provides an immediate filling effect to the treated area, while the PCL microspheres stimulate the growth of collagen as the gel is gradually degraded. By placing the product deeply on the bone, it is possible to increase the surface area of bony platform that holds the soft tissue envelop covering above it, and by placing the product in a fanning and crosshatching fashion, the product in threads restores volume in the supporting fat compartments as scaffolds, and further, to correct the descending superficial fat compartments above them, to achieve a rejuvenated proportion of the face. As opposed to the PCL-based dermal filler, the injectable PLLA is reconstituted in sterile water before injection. As the water is quickly absorbed by the body, the total injected volume decreases, which could lead to a relatively high rate of nodule formation due to particles moving close to each other. In conclusion, total facial rejuvenation to correct descending soft tissue with the PCL-based dermal filler was achieved through volume restoration in multiple tissue layers. While the above results show the effectivity of the PCL-based dermal filler, it would also be interesting to show its effectivity compared to other dermal fillers in a future comparative study. Also, based on previous studies,9,12 the above volume restoration results with the PCL-based dermal filler at 12 weeks follow-up are expected to be long-lasting; however, this has to be investigated in a follow-up study.

ACKNOWLEDGMENTS

The consent and the permission of the provided figures have been fully granted by the patient.

CONFLICT OF INTEREST

The author has no conflict of interest or financial ties to disclose.

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How to cite this article: Lin S-L. Polycaprolactone facial volume restoration of a 46-year-old Asian women: A case report. J Cosmet Dermatol. 2018;17:328–332. https://doi.org/10.1111/jocd.12482