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ORIGINAL RESEARCH

# Efficacy and Safety of Polycaprolactone Filler in Nonsurgical Rhinoplasty: A Pilot Study

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**Background:** Nonsurgical rhinoplasty (NSR) is rapidly gaining popularity due to its convenience and lower complication risks. Polycaprolactone (PCL)-based collagen stimulator provides both immediate volumization and long-term neocollagenesis. However, evidence regarding its clinical use in NSR is limited. This study aimed to evaluate the efficacy and safety of PCL-based filler in NSR.

**Methods:** We conducted a single-center, prospective study in which patients received PCL-based filler injection at baseline, followed by a supplementary treatment at 3 months. All participants were followed for at least 6 months. Outcomes were assessed using nasal anthropometric measurements, Visual Analog Scale (VAS), Global Aesthetic Improvement Scale (GAIS), and Rhinoplasty Outcome Evaluation (ROE). Repeated measures were analyzed with generalized estimating equations (GEE).

**Results:** A total of 10 patients were enrolled, all of whom completed treatment and follow-up. Compared with baseline, VAS and ROE scores showed statistically significant improvement at all post-treatment time points ($P < 0.001$). GAIS consistently indicated "much improved" or "very much improved" outcomes by both physicians and patients. Objective measurements demonstrated increased nasal length, height, depth, and tip projection, along with decreased nasal width and base width, suggesting enhanced nasal three-dimensional morphology. No adverse events were observed during the study period.

**Conclusion:** In this pilot study, PCL-based filler achieved significant and sustained improvements in nasal morphology and satisfaction. These findings support its clinical value as a safe and effective filler for nonsurgical nasal augmentation, warranting further confirmation in larger, multicenter studies with longer follow-up.

**Keywords:** nonsurgical rhinoplasty, polycaprolactone, collagen stimulator

## Introduction

With the increasing demand for nose enhancement, aesthetic practices have expanded rapidly. According to the latest ISAPS 2024 Global Survey statistics, rhinoplasty ranks fifth among surgical procedures worldwide.[1] Although widely performed, concerns about potential side effects remain. Rhinoplasty is often considered to carry various risks, such as postoperative deformities, functional impairments, and breathing difficulties.[2–5] Therefore, nonsurgical rhinoplasty (NSR) has emerged as one of the preferred options for individuals seeking aesthetic improvement.[2]

NSR involves injecting fillers into the nasal dorsum to achieve aesthetic enhancement of the nose with long-lasting effects. The main advantages of NSR include a shorter recovery period, lower risk of complications, a quick procedure, and reversibility of the effects.[6] These advantages have contributed to the increasing acceptance of NSR.[7] Previous studies have reported that NSR performed with hyaluronic acid (HA) not only carries minimal side effects and allows rapid recovery, but also results in higher overall patient satisfaction.[8,9] In addition to providing volume restoration, certain fillers may also stimulate collagen production. Even after the fillers are metabolized and absorbed, the newly generated collagen continues to provide structural support.[10–12] Moreover, the nose, compared with other facial regions, exhibits relatively low mobility and is less affected by dynamic movement.[13] Therefore, the nasal area is considered well-suited for filler treatment.

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Although fillers are considered a relatively safe option, previous studies have identified certain potential risks. A case report indicated the formation of subcutaneous nodules resulted from a foreign body reaction following dermal filler injection, which was attributed to the migration of HA away from the initial injection site after soft tissue augmentation.[14] Notably, the migration of dermal fillers may occur long after the initial injection, which can hinder timely identification and delay diagnosis.[15] In addition, excessive filler may diffuse laterally, causing nasal widening and adversely affecting the aesthetic outcome.[16] Another common adverse effect associated with filler injection is skin necrosis, which is relatively uncommon and is usually linked to the use of non-biodegradable products.[17] In the context of NSR, these risks are particularly relevant given the unique anatomical features of the nasal region, including a limited soft tissue envelope, complex vascular anatomy, and high aesthetic sensitivity. As a result, filler migration, delayed inflammatory reactions, and contour distortion may have more pronounced clinical and aesthetic consequences in the nose compared with other facial regions. Accordingly, the selection of appropriate filler materials and injection techniques is especially critical for optimizing outcomes and ensuring safety.

The use of fillers in soft tissue augmentation has been increasing. Commonly used fillers include HA,[18,19] calcium hydroxylapatite (CaHA),[20] and poly-L-lactic acid (PLLA).[21] However, these fillers may possess biostimulatory properties or lack either long-lasting effects or immediate results.[21,22] In this context, the new generation of polycaprolactone (PCL)-based collagen stimulator offers a novel option. PCL-based filler is a biodegradable collagen stimulator composed of bioresorbable PCL microspheres suspended in an aqueous carboxymethyl cellulose (CMC) gel carrier.[10] It can be applied to multiple facial regions, including the upper, mid, and lower face, to address age-related volume loss and is suitable for a wide range of indications.[12]

As a novel biodegradable collagen stimulator, PCL-based filler has attracted considerable attention for its durability and immediate effectiveness.[23] The immediate effect arises from the volumizing capacity of the CMC gel. Its high elasticity ($G' \approx 1000$ Pa) provides strong structural support and ensures even microsphere distribution in tissue, thereby minimizing migration.[11] As the CMC carrier is progressively degraded and removed via macrophage phagocytosis, it is gradually substituted by collagen induced by PCL, ensuring long-term clinical benefits.[10] Importantly, both CMC and PCL are biodegradable. CMC undergoes cellular clearance, while PCL undergoes hydrolysis of ester bonds, followed by metabolism into carbon dioxide and water, leading to complete elimination from the body.[10–12]

Despite these favorable properties, the biostimulatory and long-lasting nature of PCL-based fillers, which may share risks common to other dermal fillers, warrants careful safety evaluation, particularly in anatomically sensitive regions such as the nose, highlighting the need for prospective clinical data. At present, PCL-based filler has been approved in many countries and is widely used. However, the current evidence is still limited by the scarcity of clinical practice data, particularly with respect to its application in the nasal region, and further studies are warranted to validate its therapeutic effectiveness and safety in the real world.[10] Hence, this study aimed to evaluate the safety and efficacy of injectable PCL-based filler in NSR.

# Methods

This study was conducted as a single-center, prospective study. Patients who sought improvement of nasal appearance were included and treated with injectable PCL-based filler (Ellansé®, Sinclair Pharma, London, UK), followed by a minimum of 6 months of follow-up. Multiple approaches were used for outcome assessment to obtain both subjective and objective evaluation data.

## Study Population

The inclusion criteria of this study were healthy patients aged 18 years or older. Eligible participants were required to present with at least one of the following characteristics: (1) a low nose bridge (defined as a generally low nasal dorsum from the root to the tip); (2) insufficient nasal tip projection (requiring tip augmentation); or (3) presence of a dorsal hump.

Exclusion criteria included a history of nasal cosmetic surgery or nasal deformities too severe to be corrected with filler injection (eg, excessively large dorsal hump). Patients with known hypersensitivity to the study product, as well as pregnant or breastfeeding women, were also excluded.

## Treatment Procedure

All procedures were performed by the same dermatologist following a standardized protocol. PCL-based filler was administered in two identical stages: the initial treatment (baseline) and a 3-month supplementary treatment. For both treatment stages, local anesthesia was provided with 0.2 mL lidocaine prior to injection, and an additional 0.2 mL lidocaine was mixed with each syringe of PCL-based filler. A 25G blunt cannula was used. Linear threading injections were performed in the subcutaneous plane and the supraperiosteal layer, depending on the targeted nasal subunit. Injections of PCL-based filler were administered into up to five nasal sites (dorsum, tip, columella, columellar base, and septum), according to patient needs. The total dose was limited to 1.2 mL, with ≤0.4 mL per site.

To minimize adverse reactions and patient discomfort, post-treatment measures were implemented. Patients received 30 minutes of cold compress immediately after the injection. They were advised to avoid seafood, spicy or irritating foods, and alcohol for 1 week, as well as to refrain from strenuous exercise during the same period.

## Outcome Measurement

To obtain more comprehensive objective and subjective outcome measures, assessments were performed at different time points. The primary endpoint was the comparison of nasal morphology measurements before and after treatment, which were obtained using standardized anthropometric techniques with a protractor, set square, and vernier caliper. The secondary endpoint was the change in the Visual Analog Scale (VAS) before and after treatment. In addition, the Global Aesthetic Improvement Scale (GAIS) was assessed as an aesthetic outcome measure, while the Rhinoplasty Outcome Evaluation (ROE) scale was used to provide a reference for quality-of-life improvement before and after treatment.

## Nasal Morphological Measurements

Objective assessment of nasal morphology was performed using a protractor, set square, and vernier caliper to evaluate different nasal aesthetic subunits, including linear distances such as nasal length, height, depth, tip projection, width, and base width, as well as angular parameters such as the nasofacial, nasofrontal, nasal tip, nasolabial, and alar angles.

## Visual Analog Scale (VAS)

To assess patients' subjective satisfaction, a VAS was used for rating nasal appearance. A score of 0 indicated complete dissatisfaction, while a score of 10 indicated full satisfaction. Assessments were performed at baseline (enrollment), after the initial treatment, before the 3-month additional treatment, after the 3-month additional treatment, and at the 6-month follow-up.

## Global Aesthetic Improvement Scale (GAIS)

The GAIS includes both the Physician's GAIS (PGAIS) and the Subject's GAIS (SGAIS). The PGAIS was independently assessed by dermatologists through comparison of pre- and post-treatment photographs at the following time points: after the initial treatment, before the 3-month additional treatment, after the 3-month additional treatment, and at the 6-month follow-up. The SGAIS was completed by participants as a self-reported evaluation at the same time points.

## Rhinoplasty Outcome Evaluation (ROE) Scale

The ROE scale used in this study was translated into Mandarin Chinese with reference to previous literature.[24,25] Each item is scored from 0 to 4, yielding a total score ranging from 0 to 24, with higher scores indicating greater satisfaction. The ROE was self-administered by participants at baseline (enrollment), after the initial treatment, before the 3-month additional treatment, after the 3-month additional treatment, and at the 6-month follow-up.

## Statistical Analysis

The study hypothesis was that both subjective satisfaction scores and objective nasal morphological parameters would show significant improvement after PCL-based filler injection compared with baseline. Descriptive statistics were first applied to analyze the outcomes of various scales and satisfaction scores. Given the study design involving multiple follow-up time points, the McNemar test with Bonferroni correction was applied for pairwise comparison between

baseline and each follow-up. In addition, generalized estimating equations (GEE) were employed to evaluate repeated measures data. The model was constructed at the subject level, incorporating observations across different follow-up visits to analyze differences in each outcome measure between baseline and subsequent time points. All statistical analyses were performed using SAS software, version 9.4.

## Ethics

Prior to treatment, each patient underwent a comprehensive assessment, including injection history, drug allergy history, and medication use. The treatment procedures were explained by a trained research nurse, and participants were clearly informed of the potential risks and benefits. The study was conducted in accordance with the Declaration of Helsinki, and the study protocol was approved by the Ethics Committee of Shenzhen MYLIKE Medical Cosmetology Hospital. In accordance with institutional policy for clinical practice studies, the committee did not issue an approval number. Written informed consent was obtained from all participants before treatment.

# Results

A total of 10 eligible patients were enrolled in this study, including 9 females (90%) and 1 male (10%), with a mean age of 28.1 ± 3.3 years. All patients completed the standardized treatment protocol and follow-up, and no adverse reactions were observed.

The GAIS results demonstrated that at all post-treatment time points, both physician assessments and patient self-assessments indicated "very much improved" or "much improved" outcomes. At the 3-month additional treatment and 6-month follow-up, 100% of the assessments were rated as "very much improved" (Table 1).

The ROE questionnaire consists of six items, which were completed by patients at each follow-up visit. To compare differences between each follow-up time point and baseline, McNemar's test was applied. Complete data and statistical results are summarized in Table 2.

- **Q1 (satisfaction with nasal appearance**): After the initial treatment, 100% of participants reported being at least "somewhat satisfied", and improvements at all follow-up time points compared with baseline were statistically

**Table 1** Global Aesthetic Improvement Scale (GAIS) Results by Physicians and Subjects (N=10)

| | After Initial Treatment | 3 Months (Before Additional Treatment) | 3 Months (After Additional Treatment) | 6-Month Follow-Up |
|---|---|---|---|---|
| **PGAIS** | | | | |
| Very much improved | 4 (40%) | 5 (50%) | 10 (100%) | 10 (100%) |
| Much improved | 6 (60%) | 5 (50%) | 0 | 0 |
| Improved | 0 | 0 | 0 | 0 |
| No change | 0 | 0 | 0 | 0 |
| Worse | 0 | 0 | 0 | 0 |
| **SGAIS** | | | | |
| Very much improved | 3 (30%) | 4 (40%) | 10 (100%) | 10 (100%) |
| Much improved | 7 (70%) | 6 (60%) | 0 | 0 |
| Improved | 0 | 0 | 0 | 0 |
| No change | 0 | 0 | 0 | 0 |
| Worse | 0 | 0 | 0 | 0 |

**Notes**: Values are presented as number of patients (N) and percentage (%). Assessments were performed immediately after the initial treatment, at 3 months before additional treatment, immediately after additional treatment at 3 months, and at the 6-month follow-up.
**Abbreviations**: PGAIS, Physician's Global Aesthetic Improvement Scale; SGAIS, Subject's Global Aesthetic Improvement Scale.

**Table 2** Rhinoplasty Outcome Evaluation (ROE) Results at Different Follow-Up Visits (N=10)

| | Baseline | After Initial Treatment | 3 Months (Before Additional Treatment) | 3 Months (After Additional Treatment) | 6-Month Follow-Up |
|---|---|---|---|---|---|
| **Q1. How satisfied are you with the appearance of your nose?** | | | | | |
| Absolutely satisfied | 0 | 0 | 1 (10%) | 10 (100%) | 10 (100%) |
| Very satisfied | 0 | 10 (100%) | 8 (80%) | 0 | 0 |
| Somewhat satisfied | 0 | 0 | 1 (10%) | 0 | 0 |
| Not very satisfied | 9 (90%) | 0 | 0 | 0 | 0 |
| Not at all satisfied | 1 (10%) | 0 | 0 | 0 | 0 |
| | | ***P*=0.002** | ***P*=0.002** | ***P*=0.002** | ***P*=0.002** |
| **Q2. To what extent can you breathe through your nose?** | | | | | |
| Completely able | 10 (100%) | 10 (100%) | 10 (100%) | 10 (100%) | 10 (100%) |
| Mostly able | 0 | 0 | 0 | 0 | 0 |
| Somewhat able | 0 | 0 | 0 | 0 | 0 |
| Barely able | 0 | 0 | 0 | 0 | 0 |
| Not at all able | 0 | 0 | 0 | 0 | 0 |
| | | NA | NA | NA | NA |
| **Q3. How much do your friends and loved ones like the appearance of your nose?** | | | | | |
| Absolutely like | 0 | 0 | 5 (50%) | 10 (100%) | 10 (100%) |
| Very much like | 0 | 10 (100%) | 4 (40%) | 0 | 0 |
| Somewhat like | 2 (20%) | 0 | 1 (10%) | 0 | 0 |
| Not much like | 7 (70%) | 0 | 0 | 0 | 0 |
| Do not like at all | 1 (10%) | 0 | 0 | 0 | 0 |
| | | ***P*=0.0078** | ***P*=0.0078** | ***P*=0.0078** | ***P*=0.0078** |
| **Q4. Does the appearance of your nose limit your social or professional activities?** | | | | | |
| Never | 0 | 0 | 1 (10%) | 10 (100%) | 10 (100%) |
| Rarely | 1 (10%) | 1 (10%) | 9 (90%) | 0 | 0 |
| Sometimes | 9 (90%) | 9 (90%) | 0 | 0 | 0 |
| Often | 0 | 0 | 0 | 0 | 0 |
| Always | 0 | 0 | 0 | 0 | 0 |
| | | *P*=1.0000 | ***P*=0.0039** | ***P*=0.0039** | ***P*=0.0039** |
| **Q5. How confident are you in the appearance of your nose?** | | | | | |
| Completely confident | 0 | 0 | 2 (20%) | 9 (90%) | 10 (100%) |
| Very confident | 0 | 10 (100%) | 7 (70%) | 1 (10%) | 0 |
| Somewhat confident | 1 (10%) | 0 | 1 (10%) | 0 | 0 |
| Not very confident | 9 (90%) | 0 | 0 | 0 | 0 |
| Not at all confident | 0 | 0 | 0 | 0 | 0 |
| | | ***P*=0.0039** | ***P*=0.0039** | ***P*=0.0039** | ***P*=0.0039** |
| **Q6. Would you be willing to undergo surgery to change the appearance or function of your nose?** | | | | | |
| Definitely not willing | 9 (90%) | 0 | 0 | 0 | 0 |
| Probably not willing | 1 (10%) | 4 (40%) | 1 (10%) | 0 | 0 |
| Possibly willing | 0 | 5 (50%) | 3 (30%) | 0 | 0 |
| Very likely willing | 0 | 1 (10%) | 6 (60%) | 3 (30%) | 0 |
| Definitely willing | 0 | 0 | 0 | 7 (70%) | 10 (100%) |
| | | *P*=0.0313 | ***P*=0.0039** | ***P*=0.0020** | ***P*=0.0020** |

**Notes**: Values are presented as number of patients (N) and percentage (%). Bold P values remain significant after Bonferroni correction (α=0.0125). Comparisons were made with baseline using McNemar's test. NA = no variation, test not applicable. Assessments were conducted at baseline, immediately after the initial treatment, at 3 months before additional treatment, immediately after additional treatment at 3 months, and at the 6-month follow-up.

significant (P = 0.002). From the 3-month additional treatment through the 6-month follow-up, 100% of participants reported being "absolutely satisfied" (P = 0.002).

- **Q2 (nasal breathing)**: No adverse events affecting breathing were reported before or after treatment.
- **Q3 (acceptance of nasal appearance by friends/relatives)**: Following the initial treatment, all participants reported at least a "somewhat like" response, and improvements at every follow-up time point compared with baseline reached statistical significance (P = 0.0078). From the 3-month additional treatment through the 6-month follow-up, 100% of participants expressed being "absolutely like" (P = 0.0078).
- **Q4 (impact of nasal appearance on social or professional activities)**: No significant difference was observed immediately after the initial treatment. However, significant improvements were detected before the 3-month additional treatment, and by 3 months after the additional treatment, 100% of participants reported "never" limited. All follow-up time points showed significant improvements compared with baseline (P = 0.0039).
- **Q5 (self-confidence regarding nasal appearance)**: After the initial treatment, 100% of participants reported being at least "somewhat confident", with significant improvements at all follow-up time points compared with baseline (P = 0.0039). At the 6-month follow-up, all participants (100%) indicated feeling "Completely confident" (P = 0.0039).
- **Q6 (willingness to undergo surgery to improve nasal appearance or function)**: After the 3-month additional treatment, 100% of participants reported being at least "very likely willing". Significant improvements compared with baseline were observed before the 3-month additional treatment (P = 0.0039) and after the 3-month additional treatment (P = 0.0020). At the 6-month follow-up, all participants (100%) indicated feeling "Definitely willing" (P = 0.0020).

After adjustment for age and sex, analyses showed that compared with baseline, patients demonstrated significant improvements in both VAS and total ROE scores at all post-treatment follow-up visits. The VAS score increased significantly immediately after the initial treatment (+4.4, $P < 0.001$) and maintained the greatest improvements at both 3 months after the additional treatment (+5.7, $P < 0.001$) and at the 6-month follow-up (+5.7, $P < 0.001$). The total ROE score increased by +4.3 ($P < 0.001$) after the initial treatment, reached the maximum improvement at 3 months after the additional treatment (+7.1, $P < 0.001$), and remained significantly improved at the 6-month follow-up (+6.9, $P < 0.001$).

Regarding nasal morphological measurements, compared with baseline, nasal length, nasal height, nasal depth, and nasal tip projection all increased significantly, indicating enhanced nasal three-dimensionality (all $P < 0.001$). In contrast, nasal width and nasal base width significantly decreased ($P < 0.001$), reflecting a slimmer nasal shape. Alar length also showed a significant increase ($P < 0.001$).

For angular parameters, both the nasofacial angle and the nasofrontal angle significantly increased (maximum increase in nasofrontal angle: +6.2°; $P<0.01$), whereas the nasal tip angle and alar angle significantly decreased (minimum alar angle: −11.1°; $P < 0.001$). The nasolabial angle markedly increased (maximum +6.0°, $P < 0.001$), indicating improvements in nasal tip projection and nasolabial proportion.

In summary, compared with baseline, patients exhibited consistent and significant positive changes in both subjective satisfaction (VAS and ROE scores) and objective nasal morphology after treatment, with effects sustained through the 6-month follow-up. Complete data and statistical results are presented in Table 3.

## Discussion

This pilot study suggests that PCL-based filler, a novel collagen stimulator, is associated with improvements in patient satisfaction and quality of life. All assessment parameters showed sustained and significant improvements after treatment. Notably, the effects persisted at the 6-month follow-up; however, the durability of outcomes should be interpreted with caution, given the small sample size and limited follow-up duration. Historically, the clinical use of PCL-based filler has focused on areas other than the nasal region, such as the forehead and mid-face.[26,27] A randomized controlled trial (RCT) demonstrated that treatment of nasolabial folds with PCL-based filler in a Chinese population resulted in improvements in the Wrinkle Severity Rating Scale (WSRS) that were sustained for up to 12 months.[28] Previous studies

have highlighted the dual properties of PCL-based filler, providing both immediate volumizing and long-term collagen stimulation.[10,11] Our findings confirmed that PCL-based filler also demonstrated these characteristics in the nasal region, supporting its role as a competitive option for nasal correction.

This study adopted both subjective scales and objective anthropometric measurements to provide a multidimensional evaluation of treatment outcomes. GAIS results demonstrated consistent aesthetic appearance improvements from both PGAIS and SGAIS perspectives, while ROE scores indicated enhanced self-confidence, social engagement, and willingness to undergo nasal aesthetic procedures. Objective analyses further revealed increases in nasal length, height, depth, and tip projection, accompanied by reductions in nasal width and alar base width, indicating improved dimensional harmony and facial balance. GEE modeling confirmed that these improvements remained statistically significant across all follow-up visits after adjustment for age and sex. These findings are consistent with previous observations that the nasal region, characterized by low dynamic activity, is less influenced by facial movement, which may help explain the stability and durability of filler outcomes.[13] The results suggest that PCL-based filler offers not only immediate correction but also durable aesthetic benefits, making it a promising option for nonsurgical nasal augmentation.

In addition to efficacy and patient satisfaction, safety remains a critical aspect of all aesthetic interventions. In this study, no adverse reactions were observed among enrolled patients, suggesting that the treatment was well tolerated. The favorable safety profile of PCL-based filler may be attributed to the absorption and biodegradation of its components, CMC and PCL, which lowers the likelihood of complications compared with fillers that persist long term in tissues.[10–12] Importantly, this degradation does not compromise efficacy, as PCL-based filler stimulates neocollagenesis that maintains elasticity and smoothness at the injection site.[10] Previous clinical evidence further supports these findings. A large study involving 1111 patients reported that PCL-based filler were safe, with a low incidence of complications, all of which were mild in nature. Notably, no cases of intravascular injection, nodules, or granulomas were recorded during a 3-year follow-up period.[29] Another study in nasolabial folds confirmed that PCL-based filler treatment effects could last beyond 24 months.[30]

**Table 3** Changes From Baseline in Outcome Measures Adjusted for Age and Sex by Generalized Estimating Equations (N=10)

| | After Initial Treatment | 3 Months (Before Additional Treatment) | 3 Months (After Additional Treatment) | 6-Month Follow-Up |
|---|---|---|---|---|
| **VAS** | 4.4*** | 4.8*** | 5.7*** | 5.7*** |
| **ROE score** | 4.3*** | 5.0*** | 7.1*** | 6.9*** |
| **Nasal measurements** | | | | |
| **Nasal length (mm)** | 4.5*** | 4.2*** | 5.2*** | 5.1*** |
| **Nasal height (mm)** | 4.0*** | 3.9*** | 5.0*** | 4.7*** |
| **Nasal depth (mm)** | 3.7*** | 4.4*** | 6.9*** | 6.2*** |
| **Nasal tip projection (mm)** | 1.6*** | 1.4*** | 3.6*** | 2.9*** |
| **Nasal width (mm)** | −1.5*** | −1.1*** | −1.7*** | −1.4*** |
| **Nasal base width (mm)** | −1.3*** | −1.2** | −2.6*** | −2.3** |
| **Alar length (mm)** | 2.1*** | 1.8*** | 3.4*** | 3.5*** |
| **Nasofacial angle (°)** | 3.4*** | 3.0** | 3.9*** | 3.8*** |
| **Nasofrontal angle (°)** | 6.2** | 4.5* | 6.2** | 6.2** |
| **Nasal tip angle (°)** | −6.5*** | −3.7*** | −5.5*** | −5.1*** |
| **Nasolabial angle (°)** | 5.3*** | 3.4*** | 6.0*** | 5.1*** |
| **Alar angle (°)** | −11.1*** | −6.6** | −10.1*** | −9.4*** |

**Notes**: *P<0.05, **P<0.01, ***P<0.001. All results are changes from baseline. Assessments were performed immediately after the initial treatment, at 3 months before additional treatment, immediately after additional treatment at 3 months, and at the 6-month follow-up. Positive values indicate an increase in the corresponding length or angle, whereas negative values indicate a decrease.

**Abbreviations**: VAS, Visual Analog Scale; ROE, Rhinoplasty Outcome Evaluation.

As with other injectable fillers, common local reactions such as pain, swelling, and bruising may occur, but these can be effectively alleviated with tumescent anesthesia.[31] Although extremely rare, xanthelasma-like reactions have been reported following PCL-based filler injections.[32] Clinicians should therefore avoid overly superficial injections or treatments near the periorbital region to minimize this risk.[29]

Although this study suggests the efficacy of PCL-based filler in nonsurgical nasal augmentation, several limitations should be acknowledged. First, this was a single-center pilot study with a limited sample size, which restricts the generalizability of the findings and precludes definitive conclusions regarding efficacy and safety. Second, the follow-up period was limited to 6 months and therefore does not fully capture the long-term durability or delayed adverse events associated with PCL-based filler. Third, the absence of a control or comparator group limits direct comparison with other commonly used fillers. Accordingly, the results of this study should be interpreted with caution and viewed as preliminary and hypothesis-generating rather than confirmatory. Future studies with larger sample sizes, multicenter designs, comparative arms, and extended follow-up are warranted to further validate the long-term safety, stability, and clinical role of PCL-based filler in nonsurgical rhinoplasty. In addition, subgroup analyses based on skin type and nasal structural characteristics represent important directions for future research.

## Conclusion

This study suggests that PCL-based fillers provide effective, well-tolerated outcomes in nonsurgical nasal augmentation. Patients showed significant improvements in aesthetic appearance, satisfaction, and quality of life, with favorable changes observed at the 6-month follow-up. However, given the pilot nature of the study, the small sample size, and the resulting limited statistical power, these findings should be interpreted with caution. Further large-scale, long-term controlled studies are warranted to more robustly establish the efficacy and safety of PCL-based filler for nasal correction.

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## Disclosure

The authors confirm that no financial or conflicts of interest are relevant to this study.

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