

Nonsurgical Infraorbital Rejuvenation: A Study on the use of Cost-effective Autologous Biofiller

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Abstract

Background– The aging of the mandibular area is influenced in part by the infraorbital region, a very impressionable area. Traditional treatments included surgical removal of skin, muscles, and fat, in addition to other non-invasive procedures like as chemical peels and dermal fillers. Autologous plasma gelbiofiller is a gelatinous material created from the patient's platelet-poor plasma.

Aim and Objectives– The purpose of this study is to assess the efficacy of Biofiller in reducing wrinkle depth and improving infraorbital skin texture.

Methods– Twenty-five people, ages 40 to 65, were recruited at random to participate in a prospective observational study at the RKDF Dental College and Research Center in Bhopal. Biofiller and platelet deficient plasma gel are injected using a 30 gauge needle. Per eyelid, the volume using the linear thread method may be anything from 0.1 to 0.45 ml. Lemperle's defect scale, a visual simple scale (VAS), and a visual record recorded before and after four months of therapy were used to assess the cases.

Result– The research had 25 total participants. Average wrinkle severity was 2.29 before treatment and 1 after. This result was supported by statistical analysis. Only 4 patients reported only moderate improvement (VAS 2+), while 1 patient reported no change in texture or volume. Two people had side effects of bruising, and one person experienced side effects of swelling after 24 hours.

Conclusion– An alternate and more cost-effective method for infraorbital rejuvenation is the use of a platelet deficient plasma gel or biofiller.

1. Introduction

Bilateral, symmetrical, homogeneous pigmentation of the infraorbital areas is known as infraorbital dark circles. The infraorbital hollow that spreads infero-horizontally from the normal canthus is sometimes referred to as a “tear box distortion.”^{1,2} Due to their ability to convey a more worn-out and ageing

appearance, these disorders may be linked to severe cosmetic concerns. Topical medications, chemical peels, dermal fillers, autologous fat transfer, botulinum toxin, IPL, radiofrequency, and lasers have all been proposed as non-surgical options for enhancing and rejuvenating the infraorbital region by inducing dermal collagen remodelling and subsequent soft tissue

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augmentation without the risks and downtime associated with surgical procedures.³⁻⁴

To acquire the desired results, patients and doctors must design the optimal treatment strategy jointly because managing such a condition is typically time-consuming. Throughout the medical community, autologous plasma preparations have been used more often in recent years. Platelet-rich plasma (PRP) and platelet-poor plasma (PPP) are being studied separately to allow for the most effective use of their respective benefits. Numerous growth factors may be found in PRP, which are essential for starting and accelerating tissue homeostasis and wound healing.⁵⁻⁷

A significant impressionable area, the infraorbital region plays a specific role in the maxillofacial region's ageing process. Traditional methods included non-invasive operations like chemical peels and dermal fillers as well as surgical removal of fat, muscles, and skin. An autologous gelatinous substance called plasma gel biofiller is created from the patient's own platelet-poor plasma.⁸⁻⁹

It has been used successfully for skin regeneration and other aesthetic procedures. An alternative plasma formulation, rich in fibrin and gelled proteins that provide volume and stability at the injection site, is 6 PPP gel. It has lately been recommended for soft tissue enhancement since it is a semi-solid, simple-to-inject material that typically satisfies the required safety standards. Despite the fact that a few studies have previously assessed the therapeutic effectiveness of PRP in infraorbital rejuvenation no previously published data could be found.¹⁰⁻¹¹

The purpose of this research was to examine the efficacy of Biofiller in reducing wrinkle depth and improving skin texture around the eyes.

2. Methods and materials

Study design

It was a prospective study that included 25 study subjects who came with the complain of dark circles and wanted to have infraorbital rejuvenation at RKDF Dental College and Research Center, Bhopal. All patients gave informed consent after receiving complete information regarding the treatment's description, any potential side effects, and photographic evidence.

Sample size:

$$n = (z)^2 p (1 - p) / d^2$$

n = sample size

z = accordance to the normal distribution's z-score, which is equivalent to a 95% assurance level (in this case, 1.67).

p = fraction of the population exhibiting the trait (when uncertain, p = 0.5 is used as the estimate).

d = acceptable range of error (we need to know the actual percentage within 5%, for instance).

The calculation above yielded a minimal sample size of 24.4, which is the same as 25.

Inclusion criteria

Subjects who desired to have infraorbital rejuvenation

The adults in the age group of 40 -65 years.

The subjects having bilateral black circles and homogenous pigmentation in infra orbital region owing to ageing.

Skin types II and III

Exclusion criteria

Medically compromised patients suffering from any systemic diseases like Addison diseases responsible for pigmentation

Patients undergoing any other cosmetic treatment for pigmentation in the infraorbital region

Patients who were found allergic to the therapeutic experimental materials

3. Methodology

To make sure there wouldn't be any adverse reactions to the platelet deficient plasma gel or biofiller used in the trial, a hypersensitivity test was performed on all subjects. Injecting platelet-poor plasma gel or biofiller requires a needle with a gauge of 30. When using a linear thread approach, the volume per eyelid might be anything from 0.1 to 0.45 ml. Before and after the procedures, patients were evaluated using the

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Lemperle's wrinkle scale, a visual analog scale (VAS),
and photographs.(from Fig. 1 to Fig.

Table 1: Lemperle's wrinkle scale

Grade	Severity
0	No wrinkles
1	Just perceptible wrinkles
2	Shallow wrinkles
3	Moderately deep wrinkles
4	Deep wrinkles with well defined edges
5	Very deep wrinkles, redundant folds

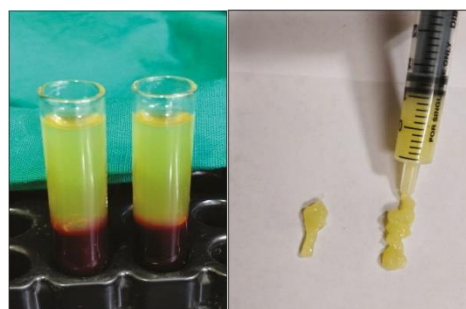


Figure 1: Materials used



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Figure 2-6: Left: before the surgery, right: after. A: reduced wrinkles and periorbital dark circles; B&C: smoother skin around the eyes

Statistical Analysis

We used the Sociology Factual Bundle to collect, clean, code, and display the data. The median and interquartile range (IQR) were introduced for non-parametric distributions, whereas the mean and standard deviation (SD) were taken into consideration when the quantitative distribution was likely to be parametric in character. Quantitative and percentage statistics were also supplied for qualitative features. We used the Chi-square test to examine groups based

on qualitative data. Repeated-Measures The independent t test was used to compare two separate groups with quantifiable data and parametric dispersion, whereas ANOVA was used to analyze more than two matched subgroups. The association between two quantitative variables within the same subgroup was evaluated using Spearman correlation coefficients. The margin of error was determined to be 5%, and the confidence interval was established at 95%. This meant that a p-value of less than 0.05 was regarded as very significant.

4. Results

Table 2: Lemperle's wrinkle scale analysis

	Wrinkle score (Mean \pm SD)	P value
		0.003
Pre treatment	2.29 \pm 0.23	
Post treatment	1 \pm 0.04	

When there was analysis on the basis of Lemperles wrinkle scale then the mean wrinkle score before treatment was 2.29 \pm 0.23 while the wrinkle score after treatment was 1 \pm 0.04. The difference was significant statistically. (p=0.003). (table 2)

Table 3: Textural and volumetric improvement

	N (%)	P value
Satisfied with their textural and volumetric improvement (VAS > +2)	19 (76)	

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Mild improvement (VAS 2+)	4 (16)	0.002
No improvement	1 (4)	

When there was analysis of textural and volumetric improvement then it was observed that 19 (76%) were satisfied with their textural and volumetric

improvement (VAS > +2). 4 (16%) study participants showed mild improvement (VAS 2+). 1 (4%) study participants showed no improvement. (table 3)

Table 4: Complications during therapy

	N (%)	P value
No side effects	22 (88)	0.004
Bruishing	2 (8)	
Swelling	1 (4)	

Then there was analysis of complications during therapy then no side effects were observed in 22 (88%) study participants while bruishing was observed in 2 (8%) study participants. Swelling was observed in 1 (4%) study participants. The difference in findings were significant statistically. (p=0.004). (table 4)

5. Discussion

Age-related changes in the maxillofacial area are exacerbated by the infraorbital region, a highly impressionable area. Minimally invasive treatments like chemical peels and dermal fillers have joined the ranks of traditional methods like surgical removal of fat, muscles, and skin. Patients' own platelet-depleted plasma is used to create plasma gel biofiller, an autologous gelatinous substance.¹²⁻¹³

It has been put to good use in skin regeneration and other forms of cosmetic surgery. The PPP gel is an alternative plasma formulation high in fibrin and protein gels, which provide volume and stability at the injection site. Because it is a semi-solid, easy-to-inject material that typically meets the required safety standards, it has recently been recommended for soft tissue augmentation.¹⁴⁻¹⁵

While a few studies have proactively explored PRP's therapeutic potential in infraorbital rejuvenation, no newly disseminated data was uncovered.^{16,17} In this

research, Biofiller's effects on infraorbital wrinkles and skin texture were measured.

The average number of wrinkles per area was 2.29 0.23 before treatment, and it dropped to 1.04 after treatment, as measured by the Lemperles wrinkle scale. There was a discernible disparity between the two groups. (p=0.003).

Seventeen out of the twenty-nine patients (76%) who had their textural and volumetric improvements evaluated reported being pleased with the results (VAS > +2). 4 (16%) study participants showed mild improvement (VAS 2+). 1 (4%) study participants showed no improvement.

The infraorbital regions' pigmentation is uniform, even, and symmetrical if you suffer from infraorbital dark circles. The infraorbital depression that runs infero-laterally from the medial canthus is medically referred to as a "tear trough deformity." It has been suggested that the infraorbital region can be improved and rejuvenated without undergoing surgery by using treatments like topical drugs, chemical peels, dermal fillers, autologous fat transfer, botulinum toxin, IPL, radiofrequency, and lasers to induce dermal collagen remodelling and the subsequent augmentation of soft tissues. Because of their potential to convey an older and more worn-out look, these diseases may be linked to major aesthetic difficulties.^{8,19}

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It takes time and effort to manage this kind of sickness, therefore the patient and doctor should work together to come up with the most effective course of therapy.

Autologous plasma preparations have seen increasing use across a number of medical fields in recent years. Many research are looking at how to best utilise the unique properties of platelet-rich plasma (PRP) and platelet-poor plasma (PPP).^{20,21} PRP has a high concentration of growth factors, which are crucial for triggering and speeding tissue homeostasis and wound healing.

To rule out any adverse reaction to the platelet deficient plasma gel or biofiller being utilised in the trial, a hypersensitivity test was performed on each participant. Plasma gel or biofiller that doesn't rely on platelets for healing injections. a 30 gauge needle is used. The volume range for the linear thread method is between 0.1 and 0.45 ml per eyelid. Before and after the procedures, patients were evaluated using the Lemperle's wrinkle scale, a visual analog scale (VAS), and photographs.

Then there was analysis of complications during therapy then no side effects were observed in 22 (88%) study participants while bruising was observed in 2 (8%) study participants. Swelling was observed in 1 (4%) study participants. The difference in findings were significant statistically. ($p=0.004$).

One of the most popular target regions for facial cosmetic treatment is the infraorbital hollows; yet, because of the complicated structure of the periorbital region, coexisting abnormalities, and potential for problems, these hollows are frequently thought to be difficult to treat. Both surgical and nonsurgical treatments (such as fillers) are available. Surgical options include lower eyelid medical surgery with fat exchange or infusions. Filler injections are one of these techniques that has gained popularity because to its minimal risk and long-term patient satisfaction. Rejuvenating infraorbital hollows with hyaluronic acid (HA) fillers has been found to be safe and effective.¹⁹⁻²³

There have been cases of persistent lower eyelid edema recorded. Acute, mild edema that appears within thirty days of injection and typically passes away on its own may be caused by poor injection technique or the wrong filler being used. More rarely,

weeks, months, or years after the injection, late-onset or chronic lower eyelid edema appears. The exact cause is frequently unknown, but it could be due to the injection technique or particular anatomical, metabolic, and immunologic characteristics of the patient. The malar septum's impermeable barrier may be strengthened by superficial filler injections, which would obstruct lymphatic outflow and cause fluid buildup. Malar edema occurrence may be decreased with proper filler selection. Successful injection techniques (including the phased approach and undercorrection), an in-depth understanding of periorbital anatomy, and knowledge of patient characteristics.¹⁶⁻¹⁸

Hyaluronidase injections can be used to dissolve any existing HA in cases of chronic edema, and then the proper filler can be used again to fill in the tear troughs.

Similar to lower eyelid edema, nodules might suddenly appear after an injection of HA filler, or they can grow over time. The cause of nodules that appear early after injection is believed to be related to the injection method, but the cause of nodules that appear later is less clear (perhaps due to a variety of immunologic triggers). If medical intervention is necessary, Late-onset nodules may be treated with a variety of treatments, including as antibiotics, steroids, and anti-inflammatory medications. An artificial bulge may develop from overcorrecting with fillers and/or putting excessive volumes in one place over the course of a single session.¹⁹⁻²³

The Tyndall effect, malar edema, and excessive filling up of infraorbital hollows may have origins in periorbital morphology. Haddock et al. found that the infraorbital hollow does not have a dissectible anatomic plane deep to the orbicularis oculi muscle, suggesting that injections made in this area might be considered "intraorbicularis." This discovery has been verified by imaging and anatomic investigations which show that preperiosteal injections of HA to the infraorbital hollows did not display a high degree of accuracy and that injected material might lie inside the muscle fibers. These results suggest that the migration of HA filler from subcutaneous to subcutaneous fat or via orbicularis oculi muscle openings may contribute to the development of periorbital edema.²⁴⁻²⁵

By dissolving the leftover filler, hyaluronidase treatment can control overcorrection of the infraorbital

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hollows. Injecting HA filler between the bilaminar subfascial membranes of the ORL may cause an oblong mass behind the eye that is difficult to remove.

Blood plasma containing fewer than 10×10^3 platelets per litre is known as platelet-poor plasma (PPP). In the past, PPP was advised to be used in platelet aggregation experiments to control the platelet-rich plasma concentration as well as to alter it. Fibrinogen, which can activate to create a fibrin-rich clot, may be present in greater amounts in PPP. This fibrin clot facilitates cell migration and adhesion, both of which are essential for wound healing.²⁰⁻²⁴

Platelet-rich plasma (PRP) has the potential to be used as an autologous degradable platform in tissue design thanks to PRP planning. When utilised in conjunction with PRP treatments, this plasma component is typically eliminated.¹⁰⁻¹⁴

6. Conclusion

Platelet-poor plasma gel, often known as biofiller, is a low-cost alternative to traditional plastic surgery for infraorbital rejuvenation.

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