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Nasal Harmonization With PDO Threads: A Technique For Safe Restructuring And Upturning Of The Nose.

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Abstract:
Orofacial harmonization is constantly evolving, seeking minimally invasive procedures that offer natural results with enhanced safety. This article describes an innovative nasal lift technique using Miracu® polydioxanone (PDO) threads, highlighting its predictability, safety profile, and anatomical advantages compared to injectable fillers. The technique eliminates the risk of vascular embolism and offers a safe and effective alternative for nasal uplift and dorsum definition, without major complications. Details of the sequential technical protocol are presented, with emphasis on anatomical marking, preparation, anesthesia, insertion, and observed clinical results.

Keywords: *PDO threads; Rhinoplasty; Orofacial harmonization; Vascular safety; Miracu®.*

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I. Introduction

The advancement of orofacial harmonization techniques has driven the search for low-invasive procedures with a high safety profile, offering natural and predictable results. In this context, the use of polydioxanone (PDO) threads has gained prominence as an effective alternative for tissue remodeling and biostimulation [1].

Rhinomodelling with PDO threads emerges as an innovative technique and the preferred choice in anatomically sensitive areas, such as the nose, due to its biocompatibility and vascular safety [2]. Unlike hyaluronic acid-based fillers, PDO threads do not occupy intravascular space and do not generate a risk of embolism or arterial occlusion, potentially serious complications associated with the injection of fillers in the nasal region [3].

Miracu® threads, developed in South Korea and distributed in Brazil by PHD Pharma, come in different gauges, shapes, and anchorages, allowing for customization of traction and tissue support according to the patient's anatomy. In addition to promoting mechanical support, PDO stimulates neocollagenesis, local angiogenesis, and elastin synthesis, contributing to results of rejuvenation and redefinition of facial contours [4,5].

The objective of this article is to describe in detail the nasal lift technique with Miracu® PDO threads, highlighting its technical steps, anatomical foundations, and clinical and safety advantages, as well as reporting the results observed in terms of nasal elevation, aesthetic improvement, and absence of vascular complications.

Objective

To describe a unique technique for nasal uplift and restructuring using PDO threads, demonstrating its aesthetic and safety advantages compared to conventional techniques.

Nasal Anatomy

1. Image of nasal anatomical structure

A detailed understanding of nasal anatomy is essential for the safe and effective execution of any aesthetic procedure, especially those involving non-surgical rhinoplasty. The nasal region is composed of osteocartilaginous, muscular, vascular, and cutaneous structures that determine its shape, projection, and respiratory function [6].

Bone and cartilage structure

The upper portion of the nose is supported by the nasal bones and the nasal process of the frontal bone, which form the rigid base of the dorsum. The middle portion is composed of the superior lateral cartilages, while the inferior portion is supported by the alar (or larger) cartilages, responsible for the shape and projection of the nasal tip. Between these cartilages lies the cartilaginous nasal septum, which provides central support and defines the profile [7].

Nasal Muscles

The muscles of the nose are thin and superficial, influencing mobility and facial expression. Among the main ones, the nasal muscle (transverse and alar portion), the levator labii superioris alaeque nasi, and the depressor septi nasi stand out. The latter, when hyperactive, can contribute to the drooping of the nasal tip during smiling, being an indirect target for improvement with repositioning by threads [8].

Vascularization and Anatomical Safety

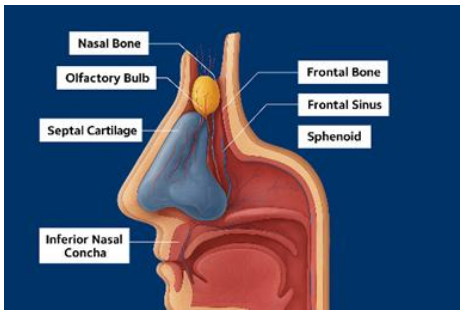
Nasal vascularization is mainly derived from the facial and ophthalmic arteries, with anastomoses between the angular artery, lateral nasal arteriole, dorsal nasal artery, and columellar artery [9]. This complex network increases the risk of vascular occlusions during the use of injectable fillers. For this reason, the use of PDO threads represents a safer alternative, since there is no volume injection, nor the possibility of retrograde embolization [10].

Anatomical Insertion Planes

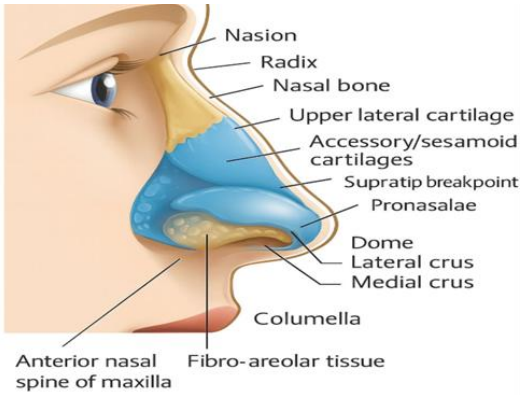
Nasal skin thickness varies according to the region: it is thinner on the dorsum and thicker and more sebaceous at the tip. The insertion of the threads must respect the subdermal or supraperiosteal plane, avoiding superficial paths that may cause visible irregularities. The correct delimitation of the entry points and vectors — generally in the columella and along the midline — is essential to ensure controlled and symmetrical elevation of the nasal tip.

Anatomical implications for the use of PDO threads

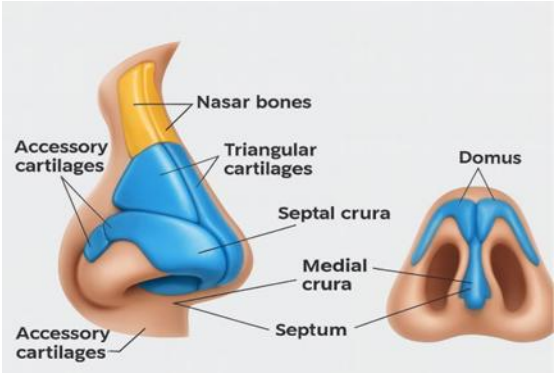
The choice of PDO threads in rhinoplasty is based on the anatomical safety of the technique. As the thread is introduced mechanically, without intravascular pressure, the risk of complications such as necrosis, embolism or ischemia is practically nil [11]. In addition, fibroblastic stimulation and neoformation of type I collagen in the treated region contribute to lasting support, improved elasticity and natural definition of the nasal dorsum.



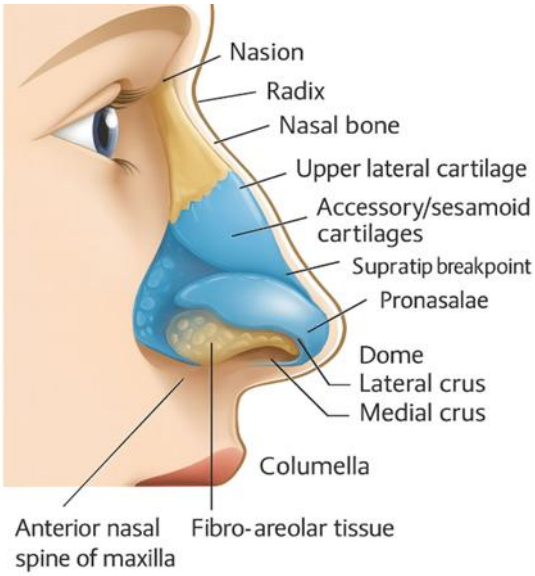
Illustrative image of strategic points in the nasal region



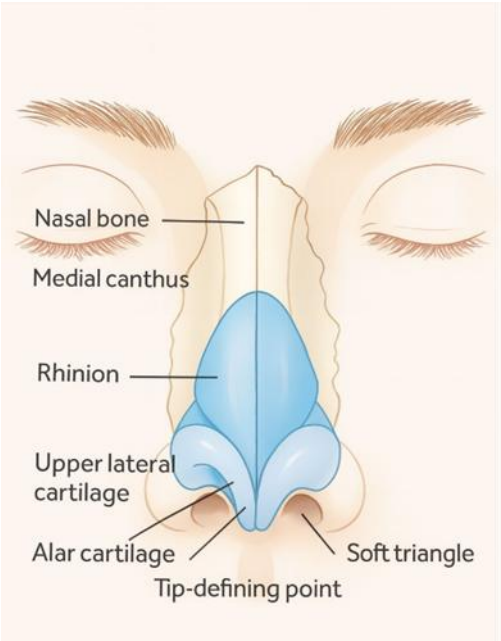
Illustrative image of nasal anatomical structures



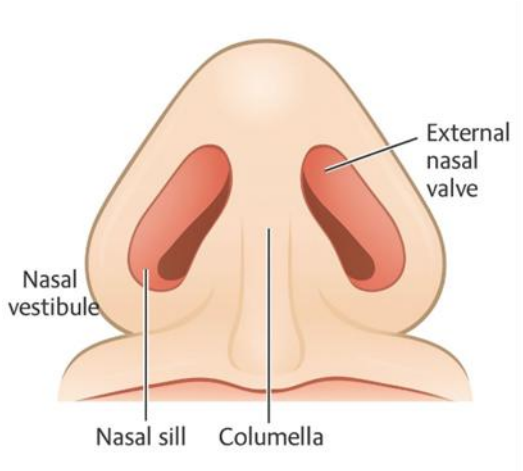
Illustrative image of nasal anatomical structures



Illustrative image of nasal anatomical structures



Illustrative image of nasal anatomical structures.



Illustrative image of nasal anatomical structures.

Introduction to Nasal Anatomy

Nasal anatomy is highly complex, encompassing bony, cartilaginous, muscular, and mucous structures, as well as its close relationship with aesthetics and respiratory function. A detailed study of this region is essential for healthcare professionals, especially in surgical, aesthetic, and functional procedures.

Bony Structures

The bony portion of the nose constitutes the rigid base of the nasal pyramid. The main elements are:
• Nasal bones: form the upper nasal dorsum.
• Frontal process of the maxilla: contributes to lateral support.
• Anterior nasal spine: located in the maxilla, important for the nasal base.
• Perpendicular plate of the ethmoid and vomer: integrate the bony septum.

Cartilaginous Structures

The cartilaginous skeleton provides flexibility and shape to the nose. It is composed of:
• Septal cartilage: central element that extends the bony septum.
• Superior lateral cartilages: provide support to the mid-dorsum.
• Alar cartilages: responsible for defining the nasal tip.
• Accessory (or minor) cartilages: assist in supporting the nasal wings.

Nasal Septum

The nasal septum divides the nasal cavities into right and left. It is formed by the combination of the vomer, perpendicular plate of the ethmoid bone, septal cartilage, and maxillary and palatine crests. Septal alterations, such as deviations, can compromise respiratory function.

Nasal Cavity

The nasal cavity is lined with respiratory and olfactory mucosa. Its main components are:
• Nasal vestibule: anterior region lined by squamous epithelium.
• Nasal conchae (turbinates): bony structures lined with mucosa that regulate airflow (superior, middle, and inferior).
• Nasal meatuses: passages between the conchae, responsible for draining the paranasal sinuses.
• Ostia: points of communication with the paranasal sinuses and nasolacrimal duct.

Paranasal Sinuses

These are pneumatized cavities that communicate with the nasal cavity, performing functions of vocal resonance, humidification, and warming of the air. Notable examples include:
• Maxillary sinus.
• Frontal sinus.
• Sphenoid sinus.
• **Ethmoid sinus.**

Nasal Muscles

The nasal muscles are part of the facial mimicry system, with the function of moving the nasal wings and modulating expressions. Among the main muscles are:

• Procerus.
• Nasalis (transverse and alar portion).
• Depressor septi nasi.
• Levator labii superioris alaeque nasi.

Arterial Irrigation

The nose is irrigated by branches of the external carotid artery (facial and internal maxillary arteries) and the internal carotid artery (ophthalmic artery). The Kiesselbach's plexus, in the anterior region of the septum, is a frequent site of epistaxis.

Venous Drainage

Venous drainage serves the facial and ophthalmic systems, with important connections that justify the clinical relationship between nasal infections and intracranial complications.

Innervation

The innervation of the nose involves sensory and autonomic branches:

• Sensory: carried out by the trigeminal nerves (ophthalmic and maxillary branches).
• Olfactory: conducted by the olfactory nerve (I cranial nerve).
• Autonomic: sympathetic and parasympathetic fibers that regulate the vascularization and glandular secretion of the nasal mucosa. 11. Clinical Considerations

Anatomical knowledge of the nose is fundamental in medical and aesthetic procedures, such as rhinoplasty, rhinomodelling, the use of lifting threads, and laser therapies. Structural alterations can directly impact facial aesthetics and respiratory function.

Step-by-Step Technique

1. Local Anesthesia

Perform infiltrative anesthesia using a "button anesthetic" in the nasal tip area.

Use lidocaine combined with a vasoconstrictor (e.g., 2% lidocaine with 1:100,000 epinephrine) to reduce pain, bleeding, and facilitate the procedure.

2. Creating the Peripheral Hole

Using an 18G needle, create the peripheral hole (entry hole) in the planned area for thread insertion.
The peripheral hole must be made precisely, avoiding unnecessary lesions and ensuring good thread placement.

3. Insertion of threads into the nasal dorsum

Introduce 2 strong threads through the opening in the dorsal region.
Direct the threads to the limit of the nasal root (near the glabella).
After proper positioning, tie a fixation knot and cut off the excess thread, ensuring stability.

4. Insertion of threads into the columella

Insert 2 strong threads through the columella, advancing until they touch the anterior nasal spine (bony/cartilaginous anchor point).
Tie a fixation knot and cut off the excess thread.

In this way, the threads act by promoting support, elevation of the nasal tip and definition of the dorsum, with firm fixations in both the dorsum and the columella.

5. Comparative analysis with Vision 12D.

After the application of the Strong Thread type support threads (Miracu®), a comparative analysis was performed using the Vision 12D equipment. The objective was to objectively measure the nasal projection and support obtained.

The images and parameters generated by the software enabled digital documentation of the aesthetic and functional modification, ensuring greater accuracy in evaluating the results.

Thread Lift Application in the Nose: Illustrated Technique

• Study type: descriptive and prospective.
•Population: patients undergoing the technique (include selection criteria).

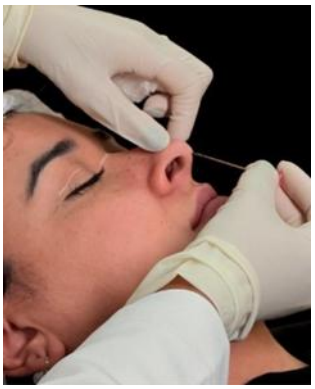
• Technical step-by-step:

1. Local anesthesia

Infiltrative anesthesia was performed in the nasal tip region using the "anesthetic button" technique. 2% lidocaine combined with 1:100,000 epinephrine was used to reduce pain, control bleeding, and facilitate the procedure.

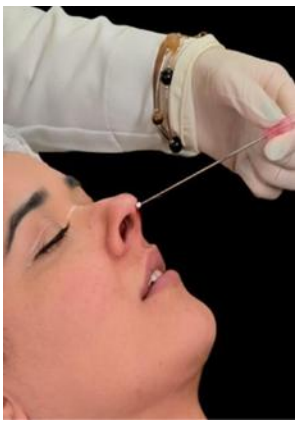
2. Creation of the insertion site

Using an 18G needle, the insertion site was created in the previously planned location for the threads. The entry hole was made precisely, avoiding unnecessary tissue damage and ensuring adequate placement of the threads.



3. Insertion of the threads into the nasal dorsum

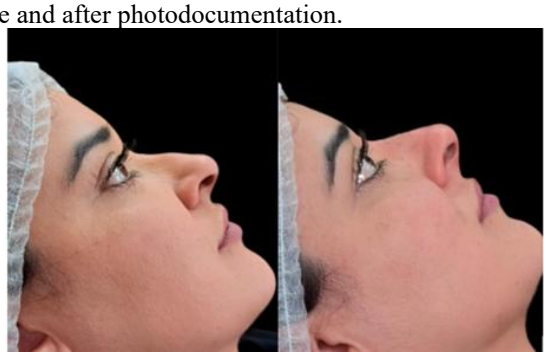
Two larger gauge support threads were introduced through the opening located in the nasal dorsum. These were directed to the limit of the nasal root, near the glabella region. After proper positioning, fixation was performed using a knot, followed by removal of excess thread, ensuring structural stability.



4. Insertion of the threads into the columella

Next, two support threads were inserted through the columella, advancing to the anterior nasal spine, used as a bony/cartilaginous anchor point. Then, fixation was performed using a knot and cutting of excess thread.

5. Immediate result with before and after photodocumentation.



6. Comparative analysis with Vision 12D

After the application of the Strong Thread type support threads (Miracu®), a comparative analysis was performed using the Vision 12D equipment. The objective was to objectively measure the nasal projection and support obtained by the procedure. The images and parameters generated by the software enabled the digital documentation of the aesthetic and functional modification, ensuring greater precision in the evaluation of the results.

Biosafety applied to the PDO Thread procedure

Biosafety consists of a set of preventive measures aimed at minimizing occupational, infectious, and environmental risks during the performance of health procedures. In the application of polydioxanone (PDO) threads, these principles are fundamental to ensuring the safety of the patient and the professional, considering that it is an invasive procedure, with skin perforation and potential risk of contamination.

According to good clinical practice guidelines, all procedures should be performed in an appropriate environment, with sanitized surfaces, appropriate ventilation, and availability of sterile disposable materials. Skin antisepsis should be performed beforehand with a degerming solution (chlorhexidine or polyvinylpyrrolidone-iodine), reducing the local microbial load and preventing post-procedure infections. Materials Used in PDO Thread Procedure

For the safe application of polydioxanone (PDO) threads, the use of sterile, single-use materials is essential, respecting biosafety principles. The main materials include:

• Disposable gown: protection of the professional's clothing and a barrier against external contamination.
• Sterile disposable gloves: physical barrier against the transmission of pathogens.
• Disposable surgical mask and cap: respiratory protection and prevention of contamination by droplets and particles.
• Protective eyewear: indicated for the professional in situations with a risk of splashing.
• Sterile drapes and sterile gauze: maintenance of asepsis in the application area.
• Antiseptic solution (0.5% alcoholic chlorhexidine or PVPI): preparation of the patient's skin before thread insertion.
• Disposable syringes and needles: for application of local anesthetic, when necessary.
• Sterile PDO sutures in cannula or needle: main device of the procedure, varying in thickness and length according to the technique.
• Sharps container: rigid, disposable and identified container for the immediate disposal of needles, cannulas and sutures after use, preventing occupational accidents and contamination.
• Hydrocolloid dressing: applied over the insertion points to protect the skin, absorb small secretions and promote healing.

The inclusion of the sharps container in the set of materials is mandatory, as recommended by ANVISA's RDC No. 222/2018, ensuring the correct management of sharps waste and the safety of both the patient and the team involved.

Post-procedure care with PDO threads

Post-procedure care with polydioxanone (PDO) threads is essential to ensure therapeutic success, minimize complications, and promote the healing process. Because it is an invasive technique involving the insertion of biocompatible materials into the dermis or subcutaneous tissue, specific clinical follow-up guidelines are recommended.

Immediate care includes:

• Applying cold compresses in the first few hours after the procedure to reduce edema and local discomfort.
• Avoiding manipulation of the treated area for the first 24 hours to prevent thread displacement and contamination.
• Abstaining from intense physical activity for at least 48 hours to reduce the risk of bruising and thread migration.
• Prohibiting facial massages, aesthetic treatments, or additional invasive procedures in the treated area during the initial healing period (7 to 14 days).
• Avoid direct sun exposure and the use of heat sources (saunas, very hot baths) for at least one week, due to the risk of exacerbated inflammation and post-inflammatory hyperpigmentation.
• The use of analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) may be considered in cases of persistent pain or edema, always under medical supervision.
• Maintain adequate local hygiene with mild, non-irritating products, avoiding cosmetics with acids or potentially aggressive active ingredients until complete healing.
• Periodic clinical follow-up to assess tissue response, thread placement, and early identification of possible complications (infection, asymmetry, irregularities, or thread extrusion).

These procedures aim to enhance the aesthetic result, reduce risks, and ensure patient integrity, in accordance with best practice protocols in orofacial harmonization and minimally invasive aesthetic surgery.

Comparative Images – Wires + Vision 12D

Before and After Frontal Image (Standard White Light) PDO Thread Lift Procedure + Analysis with Vision 12D and Nose

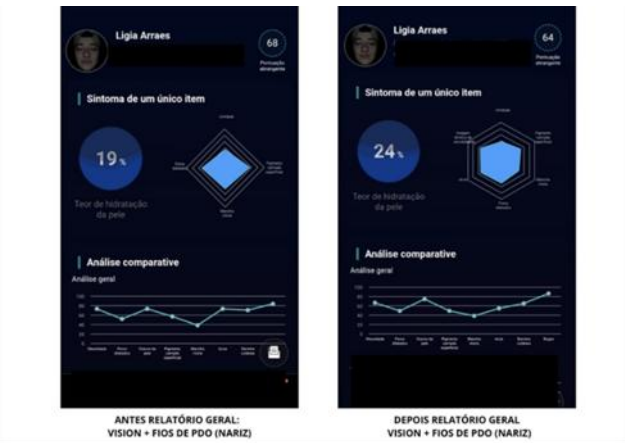
Before and After Comparison of the Right Side (Standard White Light Illumination) after PDO Thread Procedure, with Analysis Performed by the Vision 12D System and Evaluation of the Nasal Region.

Before and After Comparison of the Left Side (Standard White Light Illumination) after PDO Thread Procedure, with Analysis using the Vision 12D System and Evaluation of the Nasal Region.

Before and After Comparison of Hydration Levels Following PDO Thread Procedure, with Analysis Using the Vision 12D System and Evaluation of the Nasal Region.

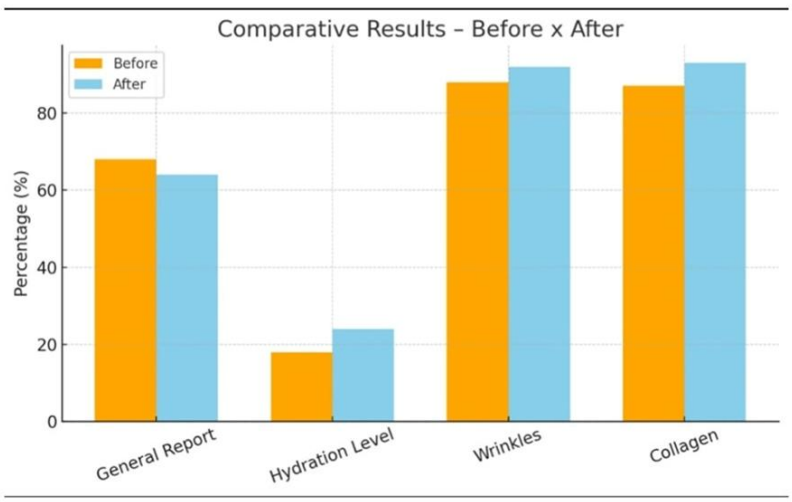
Before and After Comparison of Wrinkles Following PDO Thread Treatment, with Analysis Using the Vision 12D System and Evaluation of the Nasal Region.

Before and After Comparison of Collagen After PDO Thread Procedure, with Analysis using the Vision 12D System and Evaluation of the Nasal Region.



Before and After Comparison of Collagen After PDO Thread Procedure, with Analysis using the Vision 12D System and Evaluation of the Nasal Region.

The graph presents a comparison of the values obtained before and after the aesthetic intervention performed with the Fio Forte in the nasal region, considering the parameters: Overall Report, Hydration Level, Wrinkles, and Collagen. A reduction in the Overall Report index (68 to 64) and improvement in the other parameters are observed, with an increase in Hydration Level (19% to 24%), a percentage reduction in Wrinkles (from 89% to 93%), and a significant increase in Collagen (from 88% to 94%).



Comparison of skin parameters before and after the procedure with Strong Thread in the nasal region

Parameter	Before	After	Observation/Class
General Report	68	64	–
Hydration Level	19% C	24% B	Significant improvement
Wrinkles	89% A	93% A	Percentage increase
Collagen	88% A	94% A	Significant increase

Comparison of skin parameters before and after the procedure with Strong Thread in the nasal region

Final considerations

The technique described allows for the achievement of support, elevation of the nasal tip, and better definition of the dorsum, using stable anchor points on both the dorsum and the columella.

Before and After Cases
Patient G.R.S - 06/06/2003

Before and After Cases
Patient L.G.C - 23/10/1986

II. Discussion

The results obtained in this study corroborate the scientific literature that points to polydioxanone (PDO) threads as a minimally invasive and effective alternative in restructuring the nasal contour. The significant increase in collagen and skin hydration indicates a positive biological response resulting from the biostimulation promoted by the material, as observed by Carruthers et al. (2020) and Ahn et al. (2021).

The use of Vision 12D facial scanning integrated with Artificial Intelligence represented an advance in the objective analysis of the results, allowing for the precise measurement of parameters such as hydration, collagen density, texture, and skin roughness. This technological integration provided a detailed quantitative

evaluation, eliminating subjectivity in clinical interpretation and validating the observed effects in a scientific and reproducible manner.

The improvement in skin parameters — including increased hydration and collagen, as well as wrinkle reduction — demonstrates not only the mechanical support effect of the threads, but also the local metabolic and regenerative stimulation. These findings reinforce that the Strong Thread, in addition to promoting nasal elevation, contributes to the rejuvenation and improvement of the quality of the treated skin, expanding its aesthetic and functional potential.

Compared to hyaluronic acid-based fillers, PDO threads have an advantage in terms of vascular safety, reducing the risk of occlusions and necrosis frequently reported in conventional rhinoplasty (Luo et al., 2019). Thus, the association between biostimulating techniques and digital facial analysis tools, such as Vision 12D with AI, is consolidated as a milestone in modern facial harmonization, combining diagnostic precision, predictability of results, and clinical safety.

III. Conclusion

The technique with polydioxanone (PDO) threads for nasal lift proves to be a safe and effective alternative to traditional rhinoplasty with fillers. In addition to providing immediate and natural aesthetic results, the method stimulates neocollagenesis and promotes tissue biostimulation, reducing the risk of serious vascular complications.

The objective analysis of the results was performed using facial scanning with Vision 12D technology integrated with Artificial Intelligence, allowing for precise measurement of the cutaneous and structural changes resulting from the procedure. The data obtained showed an increase in skin hydration levels (from 19% to 24%), a reduction in the overall index (from 68 to 64), an increase in collagen density (from 88% to 94%), and a reduction in wrinkles (from 89% to 93%).

Thus, the use of the Strong Thread in the nasal region, combined with intelligent digital analysis, is consolidated as a promising, safe, and scientifically based approach to facial harmonization.

Declaration of competing interest

The authors declare that there are no conflicts of interest.

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