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AESTHETIC RESULTS, SATISFACTION, AND PAIN ASSESSMENT WITH SMOOTH PDO (POLYDIOXANONE) THREADS: CASE SERIES

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ABSTRACT

The technique of smooth polydioxanone (PDO) threads has gained prominence as a minimally invasive option for facial rejuvenation, promoting collagen biostimulation and enhancing facial contouring. This study aimed to describe a series of cases and the aesthetic results, patient satisfaction, and pain associated with the use of smooth PDO threads of different thicknesses and vectors. Five clinical cases of female patients, aged between 40 and 58 years, who underwent treatment at a specialized clinic, were analyzed. The technique used varied according to the treated area, with the threads applied in strategic vectors to maximize lifting and support effects. Patient satisfaction was assessed using the Likert Scale, and pain was measured with the Visual Analog Scale (VAS). The results indicated that all patients showed noticeable improvement in facial appearance, with high satisfaction levels (Likert Scale = 5) and pain ranging from mild to moderate (VAS from 2 to 5). Complications were minimal, and pre- and post-procedure photos highlighted the observed improvements. It is concluded that the smooth PDO thread technique is an effective and safe alternative for facial rejuvenation, with a high patient satisfaction rate and a low incidence of complications. Future studies with larger samples are recommended to confirm the findings.

Keywords: PDO threads, facial rejuvenation, collagen biostimulation, patient satisfaction, minimally invasive technique.

INTRODUCTION

Facial aging is a complex phenomenon involving structural changes in the skin, muscles, bones, and fat layers of the face. These changes, resulting from intrinsic factors such as collagen degradation and loss of elasticity, and extrinsic factors like sun exposure and pollution, contribute to the formation of wrinkles, facial laxity, and loss of facial contour. According to recent studies, collagen loss and extracellular matrix degradation are the main factors leading to the loss of skin elasticity and the formation of deep wrinkles, especially in the nasolabial and mandibular regions[1,2]. The growing demand for minimally invasive aesthetic procedures reflects the desire of many patients for natural, quick results with minimal recovery time. In this context, Brazil holds a prominent position on the global stage, being the second country in the number of aesthetic procedures, according to the International Society of Aesthetic Plastic Surgery (ISAPS, 2020). Among the most sought-after techniques are interventions using polydioxanone (PDO) threads, an innovative solution for treating facial laxity, which combines safety, efficacy, and relatively affordable cost[1-3].

PDO threads are bioabsorbable threads that not only provide immediate support to the skin but also promote collagen biostimulation, an essential component for maintaining skin firmness and elasticity (Kassir et al., 2020). This dual function makes PDO threads an attractive choice for patients seeking not only facial laxity correction but also long-term skin quality improvement[4]. The versatility of PDO threads, available in different thicknesses and shapes, allows them to be used in various facial areas, from more delicate regions like the eyelids to areas requiring greater traction, such as the jawline[2,5].

Choosing less invasive techniques is particularly relevant in the current scenario, where there is a growing demand for procedures that allow rapid recovery and can be performed in an outpatient setting without the need for hospitalization (Wattanakrai, Chiemchaisri, and Wattanakrai, 2020). Studies indicate that procedures performed with PDO threads have a favorable safety profile, with a low incidence of complications such as infection and thread extrusion[2,4]. Besides aesthetic benefits, the use of PDO threads has also been associated with improved quality of life for patients, especially those seeking a natural and discreet rejuvenation[2].

In a recent study, patients reported not only an improvement in appearance but also increased self-confidence and emotional well-being after the procedure[3]. This aspect highlights the importance of considering not just physical results but also the psychological and social impacts of aesthetic procedures. Based on the patients' individual anatomical characteristics, the choice of threads and vector placement was optimized to maximize results and minimize complications, offering a viable alternative for facial rejuvenation across different patient profiles[2,4,7].

However, as with any aesthetic procedure, it is essential that the technique is performed by qualified professionals who understand facial anatomy and the specifics of the material used, to minimize risks and maximize benefits[5,8]. The relevance of this study lies in exploring an innovative approach using smooth PDO threads of different thicknesses and vectors. The technique, aiming to maximize collagen biostimulation effects, offers a safe and effective alternative for facial rejuvenation, especially for patients wishing to avoid more invasive surgical procedures[3]. Moreover, the possibility of customizing the treatment according to the patient's individual characteristics, such as skin type and degree of facial laxity, contributes to more satisfying and long-lasting aesthetic results[8,9].

This study aims to describe a series of cases and the aesthetic results, patient satisfaction, and pain associated with the use of smooth PDO threads of different thicknesses and vectors, contributing to clinical practice by seeking evidence on the efficacy and safety of this technique.

MATERIAL AND METHODS

A descriptive and analytical study conducted with five female patients, aged between 44 and 58 years (mean age of 48.2 years; SD = 6.79), all attended at the Life Cursos e Clínica Higher Education Clinic. The study protocol was approved by the Research Ethics Committee, as per the substantiated opinion number 5,639,597 and CAAE: 63081622.3.0000.8044. All patients signed the informed consent form. A flowchart of procedure execution and evaluation can be seen in figure 1.

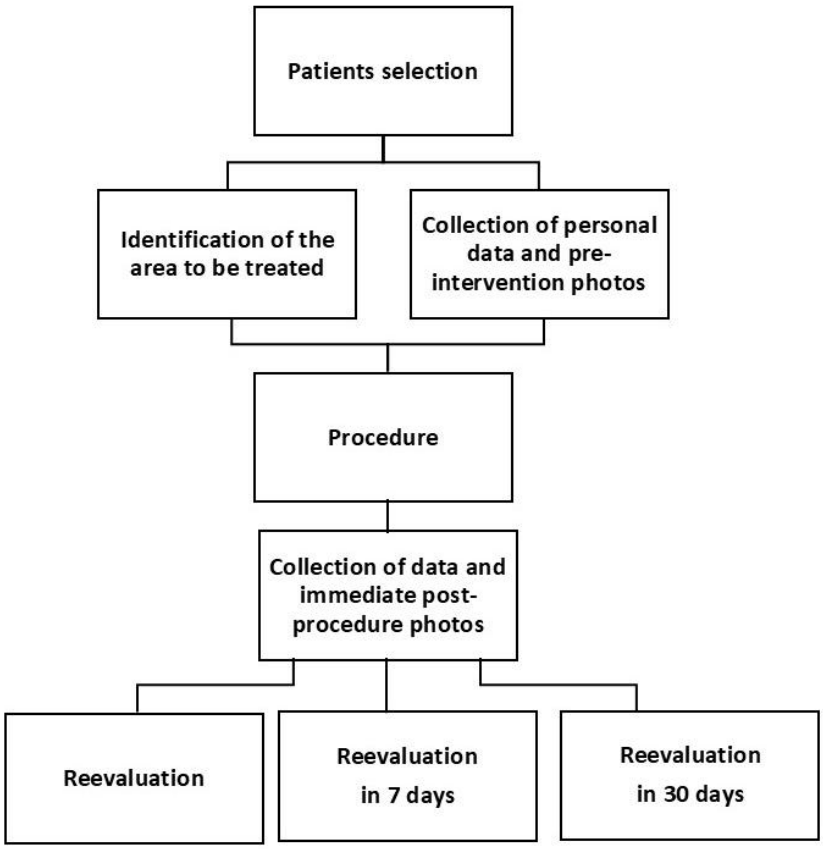

Figure 1. Flowchart of the procedure execution and evaluation steps. Flowchart showing the methodology for data selection and evaluation.

PDO Protocol

The PDO Protocol was a standardized approach for the use of smooth polydioxanone threads in facial rejuvenation procedures. Patients were selected based on a clinical assessment, considering factors such as the degree of facial laxity, skin quality, and the presence of wrinkles and folds. Patients with mild to moderate facial laxity, without significant contraindications, were considered candidates for the PDO Protocol.

Before the procedure, serial photographs were taken for documentation and comparison of results. Anthropometric data, such as blood pressure, heart rate, and oxygen saturation, were recorded. The classification of facial laxity was done using the Glogau Scale, and skin phototype was determined by the Fitzpatrick Scale.

Local anesthesia was a fundamental step to ensure patient comfort during the procedure. In the PDO Protocol, the troncular anesthesia technique was used, which varied according to the treated area. Anesthesia was applied at strategic points and, in some cases, was associated with infiltrative anesthesia at the entry points to provide greater patient comfort: Infraorbital Nerve: Used for anesthesia of the midface, especially in the nasolabial region; Supraorbital and Supratrochlear Nerves: Applied for procedures in the glabellar and frontal regions; Mental Nerve: Used for anesthesia in the mental and mandibular regions.

PDO threads came in standard lengths of 70 cm and were available in different thicknesses (from 4.0 mm to 0.0 mm). The choice of thread was based on the area to be treated and the degree of facial laxity. Thicker threads were used in regions requiring more support, while thinner threads were indicated for more delicate areas. The threads were mounted in sterile 10 ml syringes, adapted to cannulas of different calibers: 22G Cannula: Used for thinner threads in delicate regions. 18G Cannula: Employed for thicker threads in areas that demanded greater traction and support.

Thread Insertion Protocol

The procedure began with marking the areas to be treated, using anatomical reference points to ensure the proper distribution of the threads. The threads were introduced through entry points created with 18G or 22G needles, depending on the area and thread thickness. The insertion of the threads followed the force vectors defined in the prior planning. The insertion technique varied according to the needs of each region:

Fan Distribution (Cat Whiskers): Primarily used for the nasolabial area, this technique involved inserting the threads in a radial pattern, with multiple passes to ensure uniform coverage. Parallel Vectors: Applied to the jawline, the threads were inserted parallel to the lateral edge of the jaw to enhance contour and support the facial laxity tissues.

After insertion, light compression was applied to ensure the thread's fixation in the subcutaneous tissue. The cannula was then removed, leaving the thread in the desired position. The thread's end was cut flush with the skin, and a simple dressing was applied for temporary protection. In the postoperative period, basic care was prescribed, such as applying ice to the treated area and using analgesics if needed. Physical activity and excessive facial muscle movement were avoided in the first few weeks to ensure the treatment's efficacy. Patients were reevaluated after 7, 14, and 30 days, with new photographic documentation and data collection on pain, satisfaction, and any complications. The VAS (Visual Analog Scale) was used to assess pain, and the Likert Scale was employed to measure patient satisfaction.

The results were evaluated through serial photographs, pain scales (VAS), and satisfaction scales (Likert Scale). Data collection included assessments in the immediate postoperative period, and on days 7, 14, and 30 after the procedure. The incidence of complications was also recorded.

Description of Clinical Cases

Case 1: 50-Year-Old Patient, Female, Deep Nasolabial Fold

Patient A.V.A.M., 50 years old, complained of a deep nasolabial fold, resulting in a tired appearance. After clinical evaluation, the decision was made to use smooth 2.0 mm PDO threads, applied bilaterally in the midface region. The technique involved creating a fan distribution of the threads, ensuring uniform coverage of the affected area. Local anesthesia was applied using the nerve block technique on the infraorbital nerve, providing comfort during the procedure. Postoperatively, the patient reported low levels of pain and showed satisfaction with the aesthetic result, particularly in the improved projection and reduction of the nasolabial fold. The procedure was completed without complications, and the patient quickly resumed her normal activities (Figure 2).

Figure 2. Images of clinical case 1. A. Before. B. 7 days post-procedure. C. 30 days post-procedure.

Case 2: 49-Year-Old Patient, Female, Loss of Mandibular Contour

Patient D.P.B.F., 49 years old, presented with loss of mandibular contour, resulting in a "bulldog" appearance. To address this issue, PDO threads of different thicknesses were used: 2.0 mm in the midface and 0.0 mm in the mental region. The nerve block technique was employed for local anesthesia, ensuring a comfortable procedure. The threads were inserted through 18G cannulas, with a fan distribution to improve the jawline contour. Postoperatively, the patient reported minimal social downtime and high satisfaction with the results, noting a significant improvement in jawline definition and overall appearance. There were no complications (Figure 3).

Figure 3. Images of clinical case 2. A. Before. B. 7 days post-procedure. C. 30 days post-procedure.

Case 3: 40-Year-Old Patient, Female, Loss of Mandibular Contour and Dermatochalasis

Patient R.F.S., 40 years old, presented with loss of mandibular contour, associated with pronounced dermatochalasis in the infraorbital region. For this case, smooth 4.0 mm PDO threads were used in the infraorbital region and 2.0 mm in the nasolabial fold. Local anesthesia was applied using nerve block techniques for the supraorbital and infraorbital nerves, ensuring comfort during the procedure. The threads were distributed in multiple vectors, aiming not only to improve dermatochalasis but also to restore facial contour. The patient reported high satisfaction with the results, especially in the infraorbital region, where there was a significant reduction in facial laxity and improvement in the overall skin appearance (Figure 4).

Figure 4. Images of clinical case 3. A. Before. B. 7 days post-procedure. C. 30 days post-procedure.

Case 4: 44-Year-Old Patient, Female, Moderate Facial laxity

Patient M.R.S., 44 years old, presented with moderate facial laxity in the midface region. Two smooth 2.0 mm PDO threads were strategically used to promote collagen biostimulation and improve skin topography. The technique involved applying local anesthesia to the infraorbital nerve and inserting the threads through 18G cannulas. The patient reported high satisfaction with the results, noting a significant improvement in skin firmness and reduction of facial laxity, without postoperative complications (Figure 5).

Figure 5. Images of clinical case 4. A. Before. B. 7 days post-procedure. C. 30 days post-procedure.

Case 5: 58-Year-Old Patient, Female, Ptosis of the Mental Region

Patient R.C.V.M., 58 years old, presented with ptosis in the mental region and significant loss of mandibular contour. For this case, six PDO threads of different thicknesses were used: 3.0 mm and 2.0 mm in the mental region, and 0.0 mm along the jawline. The nerve block technique was used for local anesthesia, and the threads were distributed to maximize the lifting effect. The procedure was performed without complications, and the patient showed high satisfaction with the results in facial appearance, particularly in the restoration of the mandibular contour (Figure 6).

Figure 6. Images of clinical case 5. A. Before. B. 7 days post-procedure. C. 30 days post-procedure.

The cases described in this study varied in terms of aesthetic concerns and techniques applied, as summarized in Table 1 below, which presents data from the five patients who underwent facial treatment with support threads. Aspects evaluated included age, main complaint, treated region, thread thickness and number, as well as patient satisfaction and pain report.

Table 1. Methodological data of the PDO thread case series presented in this study.

Patient	Age	Main Complaint	Treated Region	Thread Thickness	Number of Threads	Likert Scale (Satisfaction)	VAS Scale (Pain)
1	50 years	Deep nasolabial fold	Midface	2.0 mm	2 threads	5	3 (mild)
2	49 years	Loss of mandibular contour	Mid and lower face	2.0 mm / 0.0 mm	4 threads	5	4 (moderate)
3	40 years	Loss of mandibular contour and dermatocalasia	Infraorbital, nasolabial	4.0 mm / 2.0 mm	6 threads	5	5 (moderate)
4	44 years	Moderate flaccidity	Midface	2.0 mm	2 threads	5	2 (mild)
5	58 years	Ptosis of the mental region	Mandibular line and mental region	3.0 mm / 2.0 mm / 0.0 mm	6 threads	5	4 (moderate)

VAS: Visual Analog Scale.

DISCUSSION

The application of smooth Polydioxanone threads in orofacial harmonization has shown satisfactory and consistent results, especially when conducted with detailed clinical evaluation and appropriate selection of vectors and thicknesses. This case series study aimed to report the aesthetic effects, patient satisfaction, and perceived pain during and after the procedure, confirming the efficacy and safety of this new vector and gauge approach.

The results obtained confirm the efficacy and safety of the technique using smooth PDO, utilizing a new vector and gauge approach. The five clinical cases presented showed noticeable improvements in facial laxity and facial contour, especially in areas such as the nasolabial fold, jawline, and the upper third of the face. Regarding satisfaction, evaluated by the Likert Scale, all patients assigned the maximum score (5 – very satisfied), reflecting a highly positive perception of the aesthetic results achieved.

These presented data corroborate previous studies indicating high approval rates among patients undergoing minimally invasive procedures with PDO threads[10,11].

In case 1, the use of 2.0 mm threads to treat the deep nasolabial fold successfully provided an improvement in facial contour, confirming what was reported before, who suggest that medium-thickness threads are ideal for areas requiring moderate support[1].

In case 2, which involved the loss of mandibular contour, highlighted the importance of using different thread thicknesses[2]. The combination of 0.0 mm and 2.0 mm threads allowed for a personalized approach that met the specific needs of the patient, resulting in a more defined mandibular contour. Although the patient reported moderate pain, the discomfort was controlled, and recovery was rapid.

In the 3th case, the use of thicker threads (4.0 mm) in the infraorbital region was effective in correcting dermatochalasis, while 2.0 mm threads were sufficient to treat the loss of mandibular contour. This case reinforces the findings of a previous study who discussed the importance of selecting thread thickness based on the area to be treated and the degree of facial laxity[3]. The high satisfaction and moderate pain reported by the patient indicated the technique was adequate, although discomfort was slightly higher due to the greater density of the threads used.

Case 4, involving moderate facial laxity, showed that 2.0 mm threads were sufficient to provide a significant improvement in skin firmness, without causing considerable discomfort to the patient. This result aligns with a previous study who recommended moderate-thickness threads for patients with mild to moderate facial laxity[5].

In 5th case, where threads of different thicknesses (3.0 mm, 2.0 mm, and 0.0 mm) were used, the combination of techniques allowed for the recovery of facial contour and correction of mental ptosis,

confirming the findings a privious study[8]. Although the patient reported moderate pain, the aesthetic result was satisfactory, with a high satisfaction index (Likert Scale = 5).

In this study, the vector approach and selection of thread thicknesses were conducted based on individualized anatomical analyses, aligning with the guidelines proposed by Karimi and Reivitis (2016)[2]. These authors emphasize the importance of customization in vector planning, considering factors such as the direction of ptosis, skin thickness, and the location of adipose pads.

Pre- and post-procedure photos showcased the improvements observed in the treated cases, confirming patient perceptions and clinical results. The images demonstrated that the use of smooth PDO threads resulted in a subtle yet effective elevation and firmness of the treated areas, without the significant adverse effects often associated with more invasive procedures.

Regarding pain, measured by the Visual Analog Scale (VAS), values ranged from 2 to 5, characterizing mild to moderate discomforts. These reports were more associated with areas of greater sensitivity, such as the lower third of the face and the glabellar area. Conversely, the use of nerve block and infiltrative anesthesia ensured satisfactory comfort for the patients, highlighting the relevance of the anesthesia technique in achieving a positive experience[6].

The technique with smooth PDO threads promotes two main effects: an initial mechanical effect and a biological one, mediated by collagen bio-stimulation. Previous studies indicate an increase in type I collagen production in tissues subjected to thread insertion, with visible results after a few weeks and long-lasting even after complete material resorption[8,12].

The marionette line, one of the main complaints of the treated patients, becomes evident with the stretching of the nasolabial fold, which generally occurs due to the reduction of subcutaneous fat in the lower inner fold region and fat accumulation (double chin) in the upper outer area. This contrast creates a well-marked division, intensified by the mandibular ligament at the lowest part of the marionette line. This ligament compresses the fold tissues, limiting their movement, and highlighting the contour[7,13,14].

In treatment of the nasolabial fold, application in a fan shape (“cat whiskers”) proved effective in volumetric redistribution and attenuation of skin depressions. Along the jawline, threads arranged parallel to the facial contour resulted in a slight lifting effect, contributing to improved tone and definition of the region. This combination of vectors is described as ideal for correcting mild to moderate asymmetries and ptoses[5].

Furthermore, patient reports indicated a quick return to daily activities, without the need for prolonged restrictions on facial movements. Such behavior contrasts with protocols involving traction threads, which often require more rigorous postoperative care and have a higher complication incidence, such as extrusion and displacement[4].

Observed complications were minimal, consisting of mild bruises that resolved spontaneously in less than 30 days. No patient required additional interventions, reinforcing the safety of the technique. Recent studies also point out low complication rates associated with using PDO threads, provided the technique is performed with anatomical precision and proper aseptic practices[4,5].

The application of smooth PDO threads in orofacial harmonization has shown satisfactory and consistent results, particularly when conducted with detailed clinical evaluation and careful vector and thickness selection[15]. Careful selection of thread type and vector distribution is essential to optimize the results and ensure safety[10].

Based on the obtained data, it is possible to affirm that the insertion technique of smooth PDO threads with different thicknesses and vectors is effective for treating mild to moderate facial laxity. Although the longevity of the effects still requires further investigation, histological studies suggest that collagen bio-stimulation persists for several months after thread resorption. This aspect makes the protocol promising not only for immediate results but also for medium-term benefits[1,12].

Another relevant factor is the reduced cost of the protocol compared to other facelift techniques, such as those using barbed or cone threads. This broadens treatment access, making facial harmonization with smooth threads a viable alternative for patients seeking minimally invasive procedures with good cost-benefit[16].

Despite the study's limitations, such as the small sample size and short follow-up period, this work offers subsidies for clinical practice and forms the basis for comparative investigations with other types of threads and techniques. Future studies with larger samples and long-term follow-up are necessary to validate the benefits of this technique and explore potential improvements in post-procedure pain management.

CONCLUSION

The findings indicate that the technique may serve as a viable option in clinical practice, demonstrating good patient acceptance and a low incidence of adverse events. Across all cases, there was a noticeable enhancement in facial appearance and skin quality, as reported by patients and assessed using satisfaction scales, delivering satisfactory aesthetic outcomes with a low rate of complications. The application of smooth PDO threads with varying thicknesses and vectors yields satisfactory aesthetic outcomes with minimal complications in the treatment of mild to moderate facial laxity.

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