Research Article

A Novel Anti-Gravitational Thread Pathway Technique to Promote Face Lift: Technical Report

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Background: Thread lifts using absorbable polydioxanone (PDO) threads are a popular minimally invasive approach for facial rejuvenation. However, limitations exist with current techniques.
Objective: Develop a new PDO thread lift technique to provide superior lifting and longer-lasting effects.
Methods: An anti-gravitational approach was designed using multiple crisscrossing PDO threads inserted upwards against gravity. Threads were anchored in fixed areas after passing through facial quadrants and repositioning structures.
Results: The technique lifted the SMAS, malar fat pad, and jowls through repositioning and multiplanar support. Thread crossing created stability and stimulated collagen. Immediate facial lifting was demonstrated.
Conclusions: This novel PDO thread technique provides robust lifting via an anti-gravitational approach and crisscrossing threads. It addresses limitations of current methods and may yield longer-lasting, more effective outcomes. Further studies will validate long-term effectiveness.

Introduction

Less invasive techniques have been developed and are becoming increasingly popular as scientists gain a better understanding of the mechanisms underlying the aging process and the mechanical anatomical vectors involved [1][2].

Therefore, thread lifting has become increasingly popular since the development of absorbable threads composed of polydioxanone (PDO), with a variety of manufacturing businesses offering many types of approaches, either for rejuvenation and/or skin lifting. Thread lifting is not a substitute for

 doi.org/10.32388/97XEBN

surgery but may help with rejuvenation and skin lifting, especially when combined with another treatment for facial rejuvenation. After introducing the thread, many histological tests have revealed dermal and subcutaneous foreign body reactions in the form of lymphocyte infiltration, collagen deposition, and fibrosis [1][3][4].

Several techniques have been reported to insert polydioxanone threads, focusing on the main goal of identifying aging vectors and countering their effects. In most cases, the authors reported significant improvements in clinical outcomes, patient satisfaction, and self-image. However, although these procedures are safe and efficient, a significant disadvantage is that they use only one or two anchoring locations, which can impair the endurance of the procedure. Furthermore, threads are typically placed in a craniocaudal direction, causing pulldown forces that may impair the ability of the procedure to achieve long-term objectives [5][6][7].

Therefore, the authors describe a new technique for anti-gravitational PDO thread insertion using a multiple anchoring site approach.

Technical Report

In this technique, the insertion of a polydioxanone thread for traction should be performed through individual entry points, in the most vertically oriented direction possible, always from the most caudal (lower) to cranial (upper) point, bottom to top, and thus, against gravity. The anchoring or fixation of the threads should also be individual, meaning that each thread has a distinct point of entry, direction, and anchoring, unique to itself. It is important to avoid having two or more threads pass through the same entry or anchoring point. The entry points should be on movable areas of the face, and a significant portion of thread anchoring is performed at approximately 1/3 to 2/3 of its length (4-7 cm), which allows for a much larger area of fixation, extensive tissue traction, and anchoring. In other words, it covers a wider range of areas to be pulled, provides better force distribution, and anchors in less movable or more stationary areas. Unlike other techniques described in the literature, there should be traction on mobile anatomical structures and fixation/anchoring in less movable or fixed areas.

Step 1 — Marking - Mapping of the Face

Determining the entry points, fixed and mobile areas, danger zones, and vectors of traction for facial structures (Figure 1).

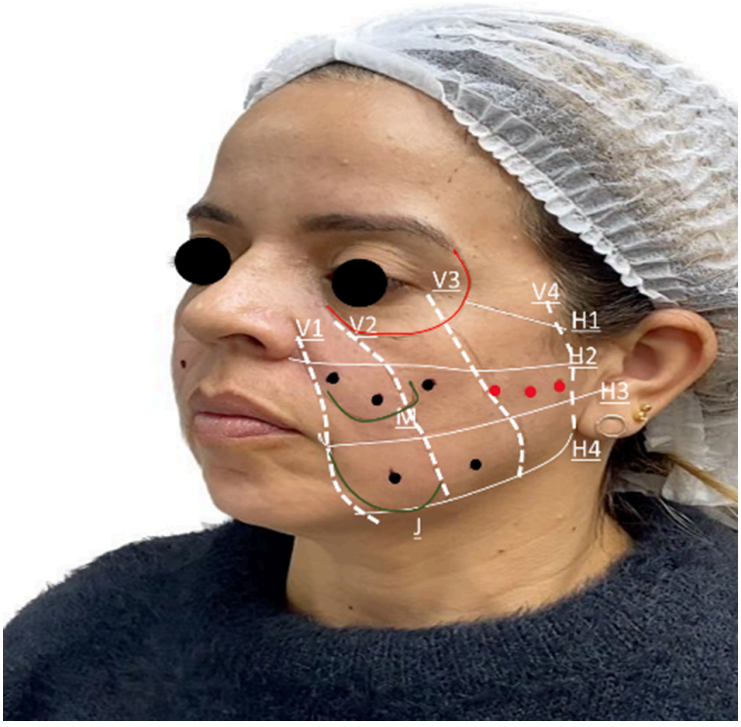

Figure 1. Mapping of the Face. Vertical Lines: V1 (nasolabial groove); V2 (masseteric ligaments); V3 (outer corner of the orbital rim to the angle of the jaw); V4 (1 cm anterior to the ear). Horizontal Reference Lines: H1 (outer corner of the orbital rim towards the upper insertion of the ear, delimiting the lower temporal septum); H2 (nasal wing to the upper edge of the tragus transition). H3 (outer corner of the mouth to the lower edge of the tragus), H4 (angle of the jaw and its entire curve and lower edge should be delimited to mark the mandibular septum). Markers of facial aging: M - Malar cushion; J, jowls.

Anesthesia: Use local anesthetic with a vasoconstrictor only at the entry and exit points. Anesthesia is not applied along the entire path. Any reference to pain suggests an error in the anatomical plane.

Choice of Threads: Molded 18G x 100 (or longer) USP 3.0 threads should be used, which can be thicker (red dots, quadrant V3V4-H2H3) (Figure 1). Spiked 19G x 100 (or longer) USP 4.0 threads or thicker threads should be used for the remaining points. Occasionally, it may be necessary to insert more threads or molded threads because of their greater tissue traction capability in the areas of the malar cushion and jowls parallel to the initially marked ones.

Step 2 — (Thread Insertion)

Next, the PDO traction threads are inserted into the skin in different directions, considering the vector of descent of the fatty pads in each region of the face or with the intention of repositioning the SMAS.

Starting with the central point, there are three selected points in a region, allowing the remaining demarcation points to be pulled or altered to produce more efficient and harmonious tissue repositioning. Despite sharing a common cranial orientation, the fixation locations on the threads are unique, providing a crisscross pattern that enables improved support, force dispersion, and fixation (Figure 2).

Figure 2. Representation of wire-fixing point (green area).

Step 2.1 — (Quadrant V3V4-H2H3, Fixed SMAS)

Begin by passing the molded 18G x 100 thread through the markings of the red points, which allows for the lifting of the entire face (Figure 3) through SMAS traction.

Path of the threads: The molded thread is inserted at a 30-degree angle to the skin and in a vertical direction until it reaches the entry point on the scalp. Upon entry, it should go deeper, superficialize the cannula to follow a subcutaneous path, and then deepen again, touching the upper part of the zygomatic bone. In the temporal muscle region, the cannula should pass through a plane of easy sliding, corresponding to the interfacial plane in the temporal fascia.

Attention should be paid to avoiding superficializing the cannula on the scalp, which could lead to post-procedure pain and damage the temporal muscle. As a precaution, with your supporting hand, the tip of the cannula is always tilted in the direction of depth, aiming to round the path following the curvature of the head (Figure 3).

Figure 3. Delineation of the path of the wires (blue dotted lines) inserted in step 2.1. Yellow area (V3V4-H2H3 region).

doi.org/10.32388/97XEBN

Step 2.2 — (Quadrant V1V2-H2H3 and V2V3-H2H3)

Once the SMAS has been tractioned and the fixed area of the face has been repositioned, the malar cushion should be lifted in the mapping of V1V2-H2H3 and V2V3-H2H3 (Figure 4).

In this case, the threads were inserted by entering through the puncture made with the tip of an 18 1 ½ needle. The cannula should be deepened to pass beneath the inferolateral portion of the orbicularis oculi muscle, return to the subcutaneous plane, and locate the sliding plane on the scalp. The tip of the cannula should not be superficialised within the scalp.

Figure 4. Delineation of the path of the wires (blue dotted lines) inserted in step 2.2. Yellow area (V1V2-H2H3 and V2V3-H2H3 region).

Path of the Threads: Insert the first thread through the central point so that, if necessary, small adjustments can be made to the lateral entry points. The tip of the cannula should be directed downward to achieve effective elevation of the malar cushion. Deepen the insertion below the malar cushion, then make an almost 180-degree turn passing beneath this structure, and subsequently find the subcutaneous plane (Figure 5).

Figure 5. Schematic of the theoretical hand maneuver to promote the elevation of the malar cushion.

Step 2.3 — (Quadrant V1V2-H3H4 and V2V3-H3H4)

The threads are inserted into the two lower points marked by the quadrants (V1V2-H3H4 and V2V3-H3H4), aiming to lift the jowl region, which is already repositioned at this point, both through SMAS traction and malar cushion repositioning. As described earlier, the threads were passed through holes punctured by an 18G 1 ½ needle until the dermis was punctured.

Path of the Threads: The cannulated traction threads are inserted through the jowls at a 30-degree angle to the skin. The depth in the jowls should be subcutaneous, crossing the region of the mandibular ligament and masseteric ligament, aiming to go as vertically as possible between the paths already formed by the threads previously inserted until reaching the scalp region, passing through the interfascial plane of the temporal muscle. This provides support from multiple points, greater resistance, and stability for tissue repositioning (Figure 6).

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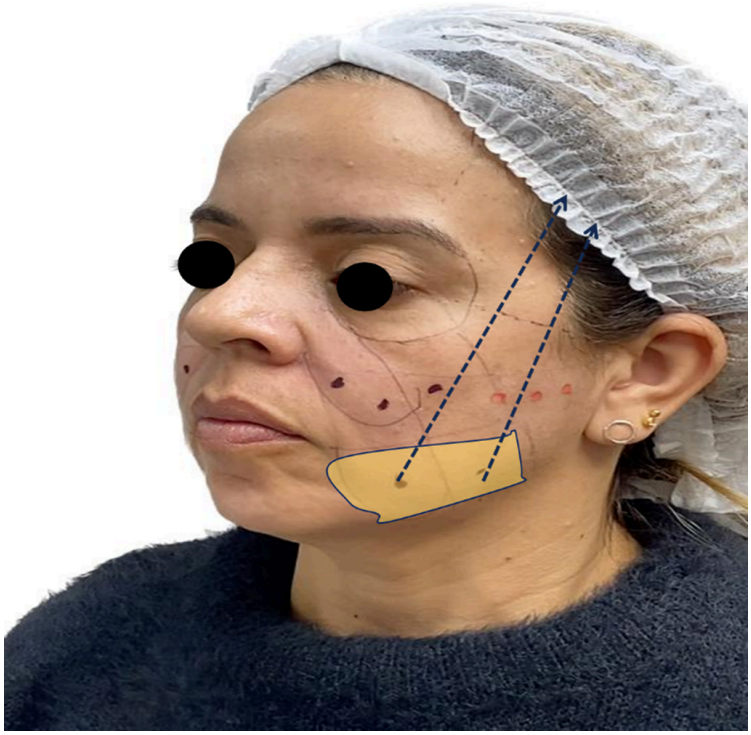

Figure 6. Delineation of the path of the wires (blue dotted lines) inserted in step 2.3. Yellow area (V1V2-H3H4 and V2V3-H3H4 region).

Step 3 — (Modeling)

After ensuring that all threads are securely anchored, pressure is applied to the fingers in the opposite direction of the traction performed. This helps improve the opening and fixation of the barbs of the thread and allows the molded threads to efficiently anchor into adjacent tissues. Next, any depressions (creases) that may remain on the skin due to inadvertent fixation of a dermal point should be undone through digital massages and pressure applied in a way that releases them, as they are unwanted and unnecessary. Keep in mind that traction should be applied to tissues below the dermis with the purpose of repositioning, not stretching (Figure 7).

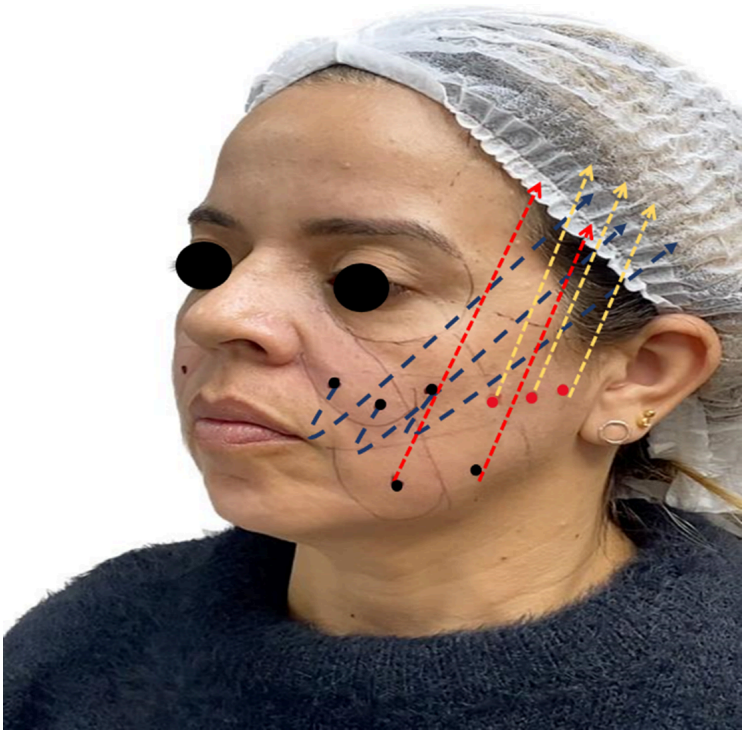

Figure 7. Theoretical crossing points of threads.

Lifting of the entire face is achieved through the repositioning of the SMAS, elevation, and fixation of the malar cushion and jowls, with anchoring of at least ¼ of the thread length beneath the temporal muscle fascia. Stability and maintenance of the outcome are achieved through crisscrossing of the threads, their passage at various depths, through ligaments and strategic anatomical regions, in addition to their bio-stimulating capacity. The threads tend to be absorbed approximately 180 days after the procedure was performed.

Final result

Figure 8 shows the intended result of the procedure, with an immediate lift of the aging structures in harmony with the other regions of the face, mostly owing to the crossing paths of the PDO thread that creates a mesh-like structure, thus performing a full facial lifting.

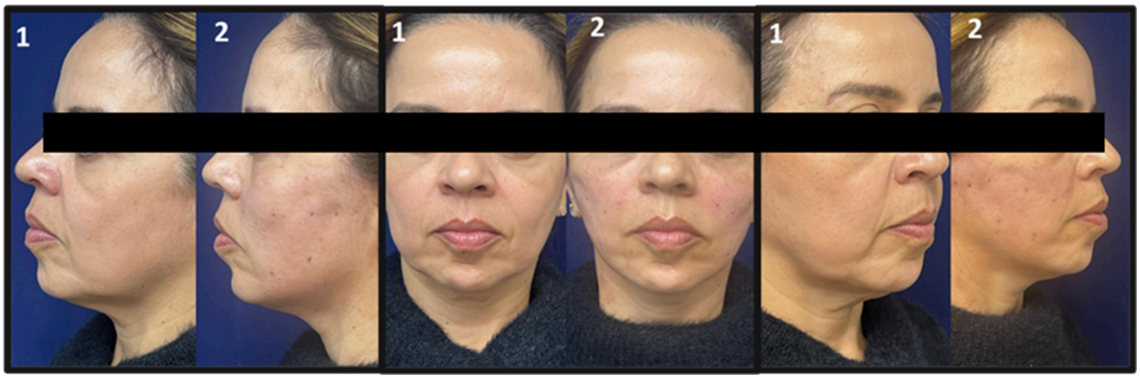

Figure 8. Preoperative and immediate postoperative results of anti-gravitational PDO thread insertion. 1: Preoperative; 2: Postoperative.

Discussion

Although suture suspension of the face is not a novel treatment, it has gained popularity with the advent of minimally invasive facelifts, mainly due to its very short recovery period and effective results.

Recently, several studies have proposed various approaches to the insertion of PDO threads. Kang et al. (2017) described the use of vertical threads to provide an optimal lift in Asian patients. The authors used 8-10 PDO threads placed in an up-to-down vertical pathway in their procedure, with a significant improvement in the Global Aesthetic Improvement Scale and a 76% patient satisfaction rate [8]. Zhukova et al. (2022) used three entrance points (upper, middle, and bottom thirds of the face) to produce an integrated lift of the face. This strategy entails inserting 3-5 PDO threads from each input point in an up-to-down pattern without crossing the thread pathway [9]. Cirillo et al. (2023) also reported a variation of the facelift with PDO threads in a fan-shaped approach using only four threads, with a 100% patient satisfaction rate [5]. Several other authors have reported their own approach to the insertion of PDO threads; however, none of them placed the threads in an anti-gravitational fashion, as proposed by the authors, but one group used a loop approach to promote multiplane suspension of facial structures [10].

Another important aspect of PDO threads is their ability to stimulate controlled inflammation and fibrogenesis. Studies have shown that the trajectory through which the PDO threads pass experiences the expression of fibrogenic markers and that the higher the number of threads, the higher the

fibrogenic stimuli [11][12]. Furthermore, Song et al. (2021) demonstrated that crossing the PDO threads in a pathway promotes a 5-fold upsurge in fibrogenesis markers. Additionally, researchers have demonstrated that the forces over a "crossing-threads" pattern might be substantially lower than those over fan-shaped patterns, which, when combined with its fibrogenesis-stimulating property, could lead to better long-term outcomes [12].

Conclusion

The present article reports a novel approach to PDO thread insertion based on three key structural points: anti-gravitational pathway lifting muscle and fat pads, multiple anchoring points, and crossing of the PDO threads. According to the authors, these three points are likely to result in an increased lift of face structures, stronger profibrotic stimulation, and long-lasting effects.

Further studies are needed to corroborate the theoretical advantages of the anti-gravitational PDO thread facelift.

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Declarations

Funding: No specific funding was received for this work.

Potential competing interests: No potential competing interests to declare.