The Renaissance of Non-Invasive Facial Rejuvenation: A Deep Dive into PDO Thread Lifts and the BISTOOL’s VXIL Innovation

Dong Jun Yang¹, Taek-Kyun Kim²*

¹Cheongdam U Plastic Surgery Clinic, 6 Samseong-ro 145-gil, Gangnam-gu, Seoul, Republic of Korea
²THE PLUS Plastic Surgery Clinic, 9 Garosu-gil, Gangnam-gu, Seoul, Republic of Korea

Email: pshereh2@naver.com

Received Date: 05 October, 2023; Accepted Date: 09 October, 2023; Published Date: 11 October, 2023

Abstract

In the rapidly evolving world of non-invasive aesthetic treatments, polydioxanone (PDO) thread lifts have emerged as a leading procedure for facial rejuvenation. The aim of this paper is to comprehensively evaluate the scientific underpinnings of PDO thread lifts, with a specific focus on the significant innovations presented by the VXIL product developed by BISTOOL Co. Ltd., Seoul, Korea. A thorough investigation was carried out, encompassing biomechanical properties and biocompatibility. Concurrently, the research delved into the unique attributes of VXIL, examining its design nuances aimed at enhancing tissue anchorage and ensuring optimal biocompatibility. The VXIL threads distinguished themselves with design advancements that not only provide superior tissue grip but also minimize potential inflammatory reactions. It has shown superior outcome in tensile strength, anchoring strength and durability via design and number of cogs as well as manufacturing method, press sculpting mold. BISTOOL’s VXIL represents a paradigm shift in the domain of PDO thread lifts, synergizing technological finesse with clinical acumen. The detailed analysis of its features, combined with the elucidation of the biological processes driving its efficiency, make it a transformative solution in the landscape of non-surgical facelifts. This research offers a pivotal resource for aesthetic professionals and plastic surgeons aiming to integrate cutting-edge innovations in their facial rejuvenation toolkit.

Keywords: BISTOOL; Facial rejuvenation; PDO thread lift; VXIL

Introduction

In the vast panorama of aesthetic medicine, the journey from simple dermal fillers to sophisticated, technologically advanced procedures have been nothing short of revolutionary. Central to this revolution is the PDO thread lift—an ingenious amalgamation of biomaterial science and surgical dexterity. (Figure 1) Historically, Polydioxanone, a biodegradable synthetic polymer, was confined to the surgical sutures arena. (Figure 2) Their exceptional biocompatibility and safety profile prompted leading aesthetic visionaries to explore their potential in skin rejuvenation. This exploration led to a paradigm shift, opening doors to extensive research, technique optimization, and a renewed emphasis on patient outcomes [1].
**Figure 1:** Various tools for facial rejuvenation according to the invasiveness. PDO thread lift has positioned as one of the mainstays.

**Figure 2:** Polidioxanone (PDO) is a polymer with p-Dioxanone which is the first monofilament product, synthesized and used as suture material in 1970’s.

The intrinsic biological mechanisms of PDO threads offer a multi-pronged rejuvenation strategy. It usually stays for 180 to 240 days in vivo, which is longer period compared to other common suture materials including PGA, PLGA and PGCL. (Figure 3) Beyond mere physical elevation, these threads actively engage the skin’s regenerative capacities. They stimulate fibroblasts, cells pivotal for collagen synthesis, infusing the skin matrix with enhanced elasticity and firmness. The induced collagen remodeling not only imparts a youthful vigor but also promotes neovascularization, vital for the skin’s radiant aura. A lesser discussed but equally significant phenomenon accompanying PDO thread insertion is the ensuing fibrotic encapsulation. As the threads undergo hydrolytic degradation, they leave behind this fibrotic scaffold, ensuring sustained elevation and enduring aesthetic outcomes [2].
**Method**

The VXIL (BISTOOL Co. Ltd., Seoul, Korea) emerges as 4th generation molding PDO threads, a testament to relentless innovation. (Figure 4) Its design nuances, like the precise calibration of diameter and design of molded cog ensure an optimal subdermal anchor. (Figure 5) This robust anchor facilitates sustained, natural-looking elevation, lending VXIL a distinctive edge over competitors. Moreover, the evolution of its barb geometry is a testament to VXIL’s commitment to excellence. (Figure 6) Fine-tuned to perfection, these barbs optimize tissue engagement while minimizing procedural trauma reaching less edema and shorter downtime. Complementing its structural brilliance is VXIL’s unmatched biocompatibility, achieved through cutting-edge manufacturing processes. (Figure 7) These processes ensure that upon insertion, the threads elicit a precisely controlled, therapeutic inflammatory response, pivotal for optimal rejuvenation. (Figure 8).

**Figure 3**: Duration of various suture materials including PDO that usually stays for about 180 to 240 days.

**Figure 4**: History of PDO thread from 1st to 4th generation.
**Figure 5:** Comparison among different types of PDO threads from 1st to 4th generation. It shows that VXIL has the strongest tensile and anchoring strength.

<table>
<thead>
<tr>
<th></th>
<th>Cutting thread1</th>
<th>Cutting thread2</th>
<th>Cutting thread3</th>
<th>Molding thread</th>
<th>VXIL/Press Sculpting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+++ (self-test result)</td>
</tr>
<tr>
<td>Anchoring Strength</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Duration</td>
<td>+</td>
<td>+</td>
<td>+++</td>
<td>+</td>
<td>+++</td>
</tr>
<tr>
<td>Tissue Trauma</td>
<td>++</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
<tr>
<td>Price</td>
<td>+</td>
<td>++</td>
<td>+++</td>
<td>+++</td>
<td>+++</td>
</tr>
</tbody>
</table>

**Figure 6:** A manufacturing and geometric difference of VXIL. A molding barb of VXIL shows stronger tensile strength than cutting barb PDO threads. The type and number of cog in VXIL make a difference in clinical outcomes.
Figure 7: Types of VXIL according to the length of PDO threads. Different types of cannula according to the purpose. N type is easy to insert but more trauma is expected due to sharp end. L and W type has blunt end, thus less bruise and bleeding follow. W type is designed to allow re-insertion with different direction before pulling out the cannula.
Peeling back the layers of VXIL’s surgical protocol reveals a procedure rich in subtilties and intricacies. Every step, from initial facial assessment to post-operative care, is a meticulous dance of science and artistry. Detailed anatomical mapping, cognizance of potential risk zones, and selecting optimal insertion planes lay the foundation. Upon this bedrock, surgeons sculpt the aesthetic masterpiece, leveraging VXIL’s unique attributes. Precise depth calibration ensures threads remain invisible, nestled in their optimal plane. Nuanced vector analysis guarantees natural, harmonious elevation. The surgical journey doesn’t culminate with thread insertion. Surgeons emphasize bespoke post-operative care regimens, tailored to individual needs. (Figure 9) This could encompass lymphatic massages, facial relaxation techniques, or specific skincare protocols, all aimed at optimizing and prolonging the rejuvenation effects.

**Figure 8:** Analysis data of the VXIL threads shows distinguished superior tissue grip in performance test and minimized potential inflammatory reactions in biologic test.

Figure 9: Various designs and procedures are available with different kinds of VXIL for facial rejuvenation including forehead, cheek, and jaw line.

Result

In the constantly evolving aesthetic universe, even revolutionary products like VXIL can’t entirely negate procedural risks. For the astute surgeon, knowledge and preparedness are the best defenses. Even though complications with PDO thread lifting procedures are few, the most frequent complaints are bruising, swelling, facial asymmetries, skin dimpling, and, in some reports, infection. Most of the reported complications are not severe and usually do not require additional interventions [3]. While VXIL’s superior design and quality standards considerably mitigate these risks, a surgeon’s arsenal should always be equipped with mitigation and management strategies. (Figures 10,11) Any new technique requires a critical analysis of potential complications [4]. So far, there were no major complications such as infection and facial nerve damage with overall high satisfaction rate during VXIL thread lift.
Discussion

Aesthetic procedures using absorbable PDO threads are an interesting alternative for facial rejuvenation. Minimally invasive procedures to rejuvenate the aging face, such as the application of threads, are booming, with an increase greater than 100-fold since 1997 [5]. Different types of threads and techniques can be used depending on the patient’s needs [3]. The technique using PDO thread does not require general anesthesia and avoided scarring, as an incision was not needed. The procedure was effective for uneven facial textures, slack midface, and minimal to moderate jowls in selected patients. The incidence of complications was low and not serious. Aesthetic procedures using PDO thread are a safe method for facial rejuvenation and lifting and there are many articles announcing
quite high satisfaction rate from the patients [5,6]. However, the number of publications related to PDO threads lift and its complications is limited in the literature [7]. In addition, the most important limitation of this technique is that it is indicated for a moderate degree of facial soft tissue laxity. Therefore, barbed suture lifting has shown a significant number of adverse events and an early recurrence of laxity [8]. There have been various efforts to reinforce the effect of PDO threads including stronger tensile strength as well as anchoring strength. Moreover, the efforts to reduce the side effects of PDO threads including tissue trauma and cytotoxicity. Actually, there is a report about the problems of some brand of PDO threads that is already approved by CE and sold in European Union. It shows that the material and safety data presented may enable improved thread design and inform clinical decision-making [1].

**Conclusion**

The aesthetic horizon is continuously expanding, with products like BISTOOL’s VXIL charting its trajectory. More than a mere innovation, VXIL is a transformative leap, setting new benchmarks in non-invasive facial rejuvenation since VXIL has been improved in performance as well as the safety. As we stand at this exciting crossroads, embracing and mastering such pioneering tools ensures unparalleled patient satisfaction and heralds a new era in aesthetic excellence.

**References**