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Complications after polydioxanone threads (PDO) for facial lifting - a literature review

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Abstract

Introduction: The popularity of cosmetic treatments is increasing, including treatments using polydioxanone (PDO) threads. Among the various complications that PDO threads can cause are swelling, skin dimpling, paresthesia, thread visibility/palpability, infection, and thread extrusion. On the other hand, it is an alternative to surgical facelift.

Purpose of work: To collect information on the complications after PDO threads for facial lifting.

Summary: In the literature review, there were reported complications after PDO threads for facial lifting as edema, allergy, inflammation, infection, skin dimpling, contour irregularity, visible threads, hematoma, thread extrusion, and incomplete facial paralysis. Knowledge of complications after face lifting with PDO threads allows us to prepare for these side effects and act appropriately in the event of their occurrence, thus avoiding the long-term effects of the cosmetic procedure.

Keywords: polydioxanone threads, facial lifting, complications, cosmetics

Introduction

The popularity of cosmetic treatments is increasing, including treatments using polydioxanone (PDO) threads also known as absorbable barbed threads. Among the various complications that PDO threads can cause are swelling, skin dimpling, paresthesia, thread visibility/palpability, hematoma, infection, and thread extrusion (1, 2).

To achieve the most natural and harmonious rejuvenation of the face, it is essential to rectify all changes resulting from the aging process (3). Lifting with PDO threads is used to combat the signs of aging, and improve the face contour, facial ptosis, and skin structure. This procedure is expensive and sometimes requires anesthesia, but it is an alternative to surgical facelifts. Correct qualification for this procedure reduces the likelihood of complications occurring after the installation of PDO threads (4).

Commercially, we have several types of threads, each of them having its unique features and slightly different application techniques (5-7).

Polydioxanone is polyester commonly used for the manufacturing of biodegradable medical devices, and so it is used for threads' production (8, 9). Commercially, we have several types of PDO threads, each of them has its unique features and slightly different application techniques. Each of the sutures is tucked in the needle or cannula. Three main types of PDO threads are recognized: monofilament threads, monofilament spiral or screw, multiple monofilament threads, and barbed sutures (10, 11). Monofilament threads are smooth sutures, that may be single or multiple, and vary in diameter and length. These are inserted in the subcutaneous tissue, removing the needle or cannula automatically leaves the thread in place. Monofilament threads are used for rejuvenation and improvement of skin quality by stimulating skin collagen production (8). However, this type of PDO thread is not used for lifting the tissues (11, 12). Screw threads are one or two intertwined threads around the needle and provide volume restoration to sunken areas of the skin (13). The type of PDO threads that have barbs or spikes are cog threads. Depending on whether the thread has barbs on four (known as 4D) or six sides (known as 6D), the pulling effect on the tissue is increased (14).

Barbs are engaged in the subdermal tissue, resulting in the lifting effect (15, 16). Enhancement is due to the formation of a "scaffold" in the soft tissue matrix. The fibrous tissue is stimulated over the barbs and it leads to the production of new collagen (17). Thread lift is a minimally invasive procedure. The technique is started by preparing the skin with an antiseptic procedure. For analgesia and hemostasis, the incision site should be anesthetized with local lidocaine 1% combined with epinephrine to extend of operation time (8). Not recommended in routine procedures, but it's possible to use antibiotics prophylaxis before treatment.

A suture needle is used to make a hole in the skin. At this stage, there is a localized pre-vector. The vectors are consistently positioned in a superior-lateral direction. However, the length of each vector is contingent upon the magnitude of the pull and the direction in which the soft tissue must be positioned. Vertical vectors are suggested for the face and horizontal for the neck. It is six pieces in total on one side, Then, adequate tension should be corrected after relaxing muscles and after this, the end of the suture is cut to allow it to end below the skin once the desired effect has been achieved (8).

In our literature review, we reported such complications after polydioxanone threads (PDO) for facial lifting as edema, allergy, inflammation, infection, skin dimpling, contour irregularity, visible threads, hematoma, thread extrusion, and incomplete facial paralysis.

Edema

Swelling is a natural response of the body to interference with tissues. Niu et al. provided a meta-analysis and systemic review of the incidences of complications following facial thread-lifting where results were as follows: swelling (35%), skin dimpling (10%), paresthesia (6%), thread visibility/palpability (4%), infection (2%), and thread extrusion (2%) (1). Swelling turned out to be the most common complication after the thread facelift, but remember that it may also be a post-treatment effect that will go away on its own. We can use cold compresses to reduce swelling. It is worth noting that not every author will consider swelling as a complication, but swelling will be considered because of disruption of tissue continuity and thread placement after the procedure. Within one month, swelling and mild inflammation may occur, which stimulates the production of collagen in the skin in response to its stimulation (18).

Allergy

PDO threads can cause allergies too. The issue with this allergy is that it presents a challenge to remove the threads after an allergic reaction. Li Y. et al. reported also one case (0,05%) in which the patient had a rash and itching following the consumption of spicy food. It happened one week after lifting with PDO threads. The patient took loratadine orally for three days and the symptoms had largely subsided and had completely vanished after one month of follow-up. Unfortunately had another recurrence a maximum 2 times a year later. PDO threads shouldn't trigger any allergic reactions, but it was observed in cases when during manufacturing using "mixing of the wires, such as heavy metals" (2). Allergies are rare however to prevent allergies, it is recommended that the patient conduct a test on a single thread in the upper limb and evaluate its response.

Inflammation and infection

In both scientific literature and commercial advertisements, the use of PDO for facelifts has been characterized as delivering prompt patient satisfaction. Although this procedure is considered safe and relatively simple, there is a risk of minor to moderate intraoperative and

postoperative complications related to the implantation of PDO threads such as infections especially when antiseptic and hygiene standards are not adhered to.

The occurrence of infection after PDO is uncommon, however, it is the most prevalent reason for thread removal. The PDO thread has the potential to cause mild to severe infections, such as abscess formation with open wounds. Infection is often caused by inadequate disinfection and sterilization. The treatment of infection may involve the local and systematic administration of antibiotics. However, for persistent infections, it is imperative to perform thread removal and thorough debridement. According to the literature, there are a few case reports of patients who developed complications caused by PDO such as an abscess following PDO due to inappropriate sterile operation at an illegal institute but the infection alleviated after drainage and thread removal ulcers multiple ulcers in the buccal, nasolabial that did not respond well to antibiotics but resolved after thread removal and debridement, infection caused by non-tuberculous mycobacteria and was treated with thread removal and systematic use of cefoxitin and clarithromycin. The present study reveals that individuals who are over the age of 50 years exhibit a significantly elevated risk of infection in comparison to their younger counterparts. However, the underlying mechanism is unknown, and further investigation is required. In seven studies, infection was reported in 22 out of 717 (3.1%) patients. The pooled incidence of infection was 2% (95% CI: 1–4%), with significant heterogeneity (1). A study by Sulamanidze et al. found that patients experienced a variety of late or persistent post-surgical complications including contour irregularity (2.8%), asymmetry (3,0%), visible skin retractions (1,0%), injury to vessels, nerve, or gland (0,02%) and infection/ inflammation (0,01%) (19). Although, infections and chronic inflammatory reactions are rare, educating patients about trauma prevention after the threads have been inserted is one way to avoid inflammation (20). If patients experience a persistent inflammatory response, it is imperative that we commence treatment with antibiotics first. Nevertheless, if it fails, surgical removal must be considered, even if the wounds remain (19). Furthermore, there is a growing concern regarding the potential complications associated with this procedure, as it is increasingly being executed in nonmedical settings, such as beauty salons. Shin et al. had observed infection lesions after PDO thread-lift, caused by *Mycobacterium Massiliense*, and carried out in nonprofessional facilities. Lesions were treated with empirical antibiotics (clarithromycin per os and amikacin intramuscular injection) with satisfactory effect. This proves to prevent the use of invasive procedures in nonmedical aesthetic clinics (21).

Other studies have shown that one of the primary unintended risks associated with non-surgical facial cosmetic procedures (Orofacial Harmonization) is necrosis, which arises from infections. The process of orofacial harmonization involves the enhancement of the patient's facial appearance using procedures such as facial filling with biomaterials, botulinum toxin administration, bichectomy, cervical liposuction, and rhinomodeling. Studies indicate that infections constitute approximately 0.7% to 8.9% of the complications associated with such procedures. The authors who reported a 0.7% rate of complications of this type chose to prescribe post-procedure broad-spectrum antibiotic therapy (22). It is crucial to avoid infection, which may lead to the deterioration of the patient's condition. Attention to antiseptic standards should be the highest priority for every person performing this procedure.

Skin dimpling

After the insertion of PDO threads, depressions and dimpling of the skin can occur. This is a complication that is often described and reported by patients. Li Y. et al. described a total of 190 patients with postoperative complications of facelifts. The following complications after PDO were noted: skin dimpling (40.5%); contour irregularity (16.8%); visible threads (16.3%); thread extrusion (5.3%); infection (8.9%); swelling (4.7%); incomplete facial paralysis (2.6%); hyperpigmentation (2.1%); hematoma (2.1%); allergy (0.05%) (23). Skin dimpling is the most common complication after PDO according to this study. Skin dimpling may disappear on its own or after gentle daily massage (18).

Contour irregularities / Asymmetry

Mild asymmetry and contour irregularities were observed in many cases, but this was periodically, transient, and was always corrected by additional techniques with threads, such as placement or positioning. Lycka and colleagues experienced that 3.5% of patients observed asymmetry and 3.6 % required revision. The whole group with satisfactory results after the procedure was 97.7% (24). Horne et al. described in several patients the discomfort caused by asymmetry after using contour threads. It was addressed by releasing barbs, adding more sutures, or making new incisions (25). PDO threads are a simple and safe way to lift facial tissue without surgery. There have been complications with this procedure, as with other cosmetic procedures (7).

Hematoma

Blood vessel injury is a common consequence associated with any invasive procedure. For instance, Suh et al. reported bruising, which occurs as a result of trauma to the capillaries and small veins, in 29 patients, that is in 93,5% (12). A hematoma is considered to be a collection of blood resulting from the leakage of a larger blood vessel and its incidence after PDO suture lifting is an uncommon complication. Li Y. et al. reported a hematoma incidence of 2,1%, that is 4 cases in a group of 190 patients (2). In studies with smaller cohorts, there were no cases of hematoma. Most patients with minor bruising after the procedure do not require additional treatment while the hematoma is treated by pressure bandaging and cold compresses (2). However, in all reported in the literature cases of hematoma, patients were fully recovered. Neither bruises nor hematomas left any irreversible side effects. Furthermore, Rachel J. described visible or palpable thread in 8 out of 29 reported patients after PDO thread insertion. However, this visibility decreases as the threads are absorbed (26).

Thread extrusion

Thread extrusion and/or visible, palpable threads occur after the PDO threads are placed (27). For instance, an additional extrusion case was identified among a cohort of 80 patients and was reported by Isse. Two patients had an extrusion of a single suture. The distal end of the sutures became visible along the lower border of the mandible after they migrated caudally.

The distal migration of the jaw was probably caused by movement of the jaw in both of these patients (28). Furthermore, Rachel J. et al. described visible or palpable thread in 8 out of 29 reported patients after PDO thread insertion (26). Granuloma formation can be triggered by suture extrusion. In the described case, it was possible and effective to remove the thread surgically. Any exogenous material can result in a granulomatous reaction after implantation (29). Absorbable threads were associated with a significantly lower risk of thread extrusion than non-absorbable threads, with a 1.6% vs. 7.6% risk (1).

Incomplete facial paralysis

Facial paralysis is a very rare complication and may affect a single branch or multiple branches of the facial nerve. Li Y. et al. reported 5 cases in a group of 190 patients (2,6%), including 3 cases involving the temporal branch, one zygomatic branch, and one involving multiple branches (2). Symptoms depend on the affected branch and include unilateral weakness of eyebrow movement and an unilaterally closed eye. They occur almost immediately after the procedure and result from the nerve injury causing swelling. Steroids were used for treatment and all patients in the study were completely cured. Although facial nerve paralysis after PDO threads implantation is not common and is reversible, it should be remembered and better familiarity with facial anatomy can minimize the risk of this complication (2). On the other hand, threads can be used for static reanimation of the paralyzed face to improve facial symmetry. These threads can help alleviate symptoms related to eyelid closure by increasing the support of the lower eyelid. They can also improve oral function by strengthening the cheek and lifting the drooping corner of the mouth (30).

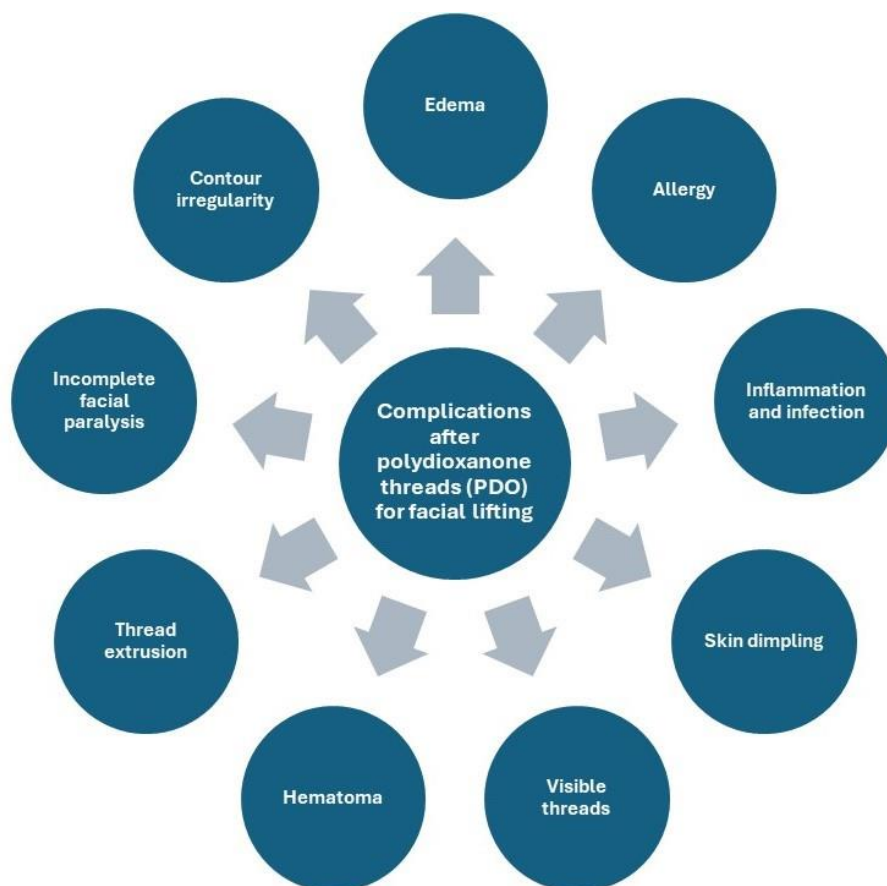


Figure 1. Graphic showing a set of complications after polydioxanone threads for facial lifting.

Conclusions

Patient satisfaction with this procedure is high, it was about 8-9 points out of 10 in the first and sixth months (18). Approximately 76% of patients showed generally satisfactory results of PDO threads lifting for facial rejuvenation as excellent (31). The optimal outcomes obtained immediately following the application remained stable for a duration of six months to one year (9). It depends on choosing the optimal type of thread for the right patient to take into account the degree of skin laxity, texture, facial volume, and expectations. Thread lifts are not recommended for patients who exhibit extremely saggy skin because tightening the thread over the lifting area is necessary to achieve appropriate and lasting effects (13). The jawline, midface, eyebrows, and neck are the most common sites for thread lifting (32). The “thread lifting” should not be seen as a replacement for a surgical facelift (33). Despite the new technological innovations of PDO threads, it should be viewed as a temporary treatment that can be used until the patient ages and needs more procedures. Non-surgical methods are a complement to the old-fashioned techniques of facial rejuvenation (13, 31). Thread lifting is a relatively safe procedure (34, 35). Complications can be avoided significantly with increasing experience, using the right thread insertion techniques, and being as careful as possible about procedural antiseptics (18). We should bear in mind that original works that contain data on side effects of thread use group side effects differently, and in some of them, one of the most common side effects was pain (26).

DISCLOSURE

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