



Research Article

The Understanding and Stability of Insertion Layers in Thread Lift

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Abstract

Thread lifting is popular for addressing the loss of facial skin elasticity and reducing wrinkles. However, the incidence of complications varies with the practitioner's competence, the characteristics of materials used, and variations in procedural techniques. Therefore, this study aimed to compare the outcomes of thread lifting procedures based on the insertion layer and suture length to propose different techniques tailored to the objective of thread lifting. We assessed the major complications observed in individuals who underwent thread lifting to evaluate the overall efficacy and safety of the procedure. From March 2022 to January 2023, we performed thread lifting using Vxil threads with uni- and multi-layer insertion on 24 patients, and evaluated the outcomes and complications. The mean age of the patients was 37.5 (range 24-63) years, and the mean follow-up period was 199 (range 188-207) days. An average of 4.4 long lines (2-8 lines) and 12.6 middle lines (8-16 lines) were used. The degree of pulling after insertion varied with the technique and length of threads. For uni-layer insertions, a greater amount of tissue displacement was observed. Displacement was also greater using long lines than using middle lines. The global aesthetic improvement scale score increased, indicating increased satisfaction, at the 3-month and 6-month follow-ups. Reported complications included edema, pain, foreign body sensation, bruising, asymmetry, and temporary sinking. Clinicians need to choose the appropriate thread and procedure technique based on their research and efforts to minimize complications and boost patient satisfaction.

Keywords: Aging; Rhytidoplasty; Subcutaneous Tissue; Superficial Musculoaponeurotic System

Introduction

The desire to appear youthful regardless of actual age has persisted over generations. With particularly heightened interest in addressing the loss of facial skin elasticity and reducing wrinkles, numerous procedures have been developed for such purpose, and the effectiveness and safety of these procedures are continually being improved [1,2]. Among them, thread lifting has gained widespread popularity in recent years, owing to its minimally invasive approach while delivering satisfying outcomes for individuals across different age groups [3]. Nevertheless, the incidence of complications ranges widely depending on the practitioner's competence, the characteristics of materials used,

and variations in procedural techniques [1,4,5]. To achieve the desired outcomes from thread lifting procedures, inserting the sutures into the targeted layers based on a profound understanding of anatomical structures is important. In this study, we compared the outcomes of thread lifting procedures based on the insertion layer and suture length to propose different techniques tailored to the objective of thread lifting. Additionally, we assessed the major complications observed in individuals who underwent thread lifting to evaluate the overall efficacy and safety of the procedure.

Materials and Methods

The procedure was performed on 24 patients between March 2022 and January 2023. We performed uni- and multi-layer insertion on all patients and evaluated the outcomes. Uni-layer insertion involved only one layer for thread placement: the superficial fat layer. Multi-layer insertion involved threading

through the superficial fat layer, with partial involvement of the superficial musculoaponeurotic system (SMAS) and deep fat layer [6]. (see Figure 1). We used Vxil threads from Bistool (Seoul, Korea), characterized by their bidirectional barbs that enable more precise procedures in patients with varying skin thickness. We combined long lines and middle lines to maximize the desired effects. One surgeon performed the procedures. The thread was pulled with consistent tension upon insertion, and facial tissue mobility was examined during the traction. To examine the outcomes of thread lift alone, we did not perform other procedures such as Botox and fillers.

The longevity of Polydioxanone (PDO) threads within the body is approximately 6 months. Therefore, we followed patients up for 7 months from March 2022 [7]. Postoperative satisfaction was surveyed using a written questionnaire at the 3-month and 6-month follow-up using the five-point Global Aesthetic Improvement Scale (GAIS) [8]. We also examined the incidence, duration, and treatment for complications such as edema, pain, foreign body sensation, bruising, asymmetry, and skin sinking.

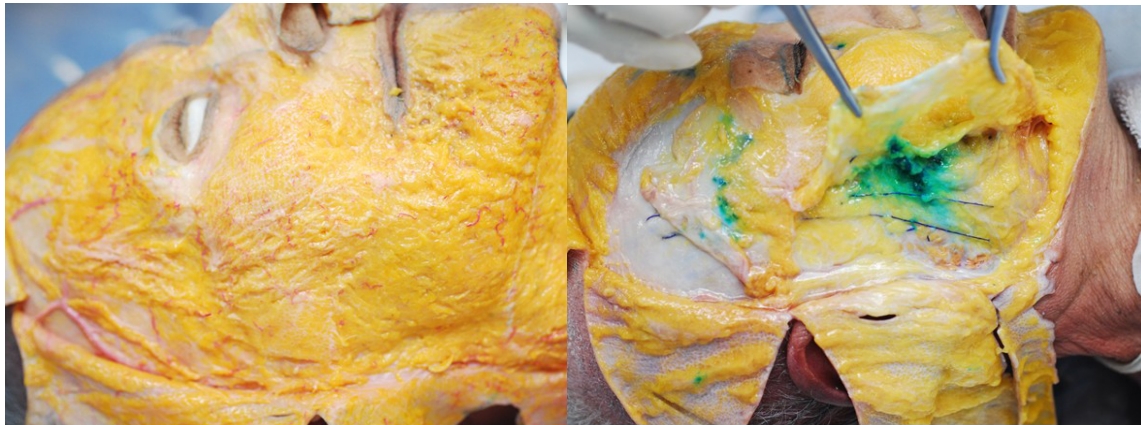


Figure 1: Image of a cadaver showing the subcutaneous layers (A) Superficial fat layer: a thin and firm layer beneath the dermis where the thread is pulled through during uni-layer insertion. (B) Multi-layer insertion thread lift; the thread is pulled through the superficial fat layer, superficial musculoaponeurotic system (SMAS), and deep fat layer.

Results

The mean age of the patients was 37.5 years (range 24-63). The mean follow-up period was 199 days (range 188-207). None of the participants had a major underlying disease, and 5 (20.8%) had a history of the same procedure. The medical supplies used for the procedure were Vxil, long and middle lines from Bistool. An average of 4.4 long lines (2-8 lines) and 12.6 middle lines (8-16 lines) were used. The degree of pulling after insertion varied depending on the technique and length of threads. For uni-layer insertions, a greater amount of tissue displacement was observed. More traction was needed to achieve the same displacement level during multi-layer insertion. Displacement was greater using long lines than using middle lines. The GAIS score increased, indicating increased satisfaction, at the 3-month and 6-month follow-ups (Table 1).

GAIS	3-month follow up	6-month follow up
Worse. (-1)	0 (0%)	0 (0%)
No change (0)	3 (12.5%)	5 (20.8%)
Slightly improved (1)	12 (50.0%)	14 (58.3%)
Much improved (2)	6 (25.0%)	3 (12.5%)
Very much improved (3)	3 (12.5%)	2 (8.3%)

Table 1: GAIS score at 3-month and 6-month follow up.

The incidence and treatment for all complications that occurred in the patients within 6 months after the procedure were reviewed. Of 24 patients, 17 reported at least one discomfort. The most common discomfort was swelling (n=14, 58.3%), followed by pain (n=13, 54.1%), foreign body sensation (n=13, 54.1%), and bruising (n=12, 50%). Other complications included asymmetry and temporary sinking. Complications reported by previous studies, such as thread protrusion, infection, granulomas, hematomas, nerve injury, and

excessive bleeding, were not observed. The mean duration of these complications was 7 days for edema, 9 days for bruising, and 7 days for asymmetry. The mean duration of skin sinking was 59 days, up to 112 days. Foreign body sensation was the most persistent complication, with an average duration of 89 days and a maximum of 204 days (Figures 2,3).



Figure 2: Pre and postoperative views of a 30-year-old woman. (A). Preoperative view, (B) Six months after the thread lift. Shows improvement of the jowl and increased cheek volume with multi-layer insertion.



Figure 3: Pre and postoperative views of a 27-year-old woman. (A) Preoperative view. (B) Six months after the thread lift. Shows improved nasolabial fold and jaw contour and increased cheek volume with multi-layer insertion.

Discussion

The use of thread lifting has increased worldwide owing to shorter surgery with minimal scarring and quick recovery compared to facelifts, and many techniques have been developed [7,9]. In many cases, undesirable outcomes occur in thread lifting when the thread is inserted into the incorrect layer [10]. The two major intended effects of thread lifting are pulling tissue upwards and layering tissue to create volume. These outcomes vary depending on the direction of progression of the threads upon insertion [6]. In the human subcutaneous tissue, fats are divided into two layers: a small and firm superficial layer and a large and soft deep layer. A lubricating layer with different names facilitates tissue mobility between these two layers. The superficial and deep fat layers are lubricated in the face area by the Superficial Musculoaponeurotic System (SMAS) layer and superficial muscle layer. These layers enable smooth tissue mobility and help maintain the retaining ligaments in each area. If threads are inserted into a single superficial fat layer, the lubricating layer enables easy movement of the tissues. This makes the technique appropriate for upward displacement or displacement of tissues in specific areas. Therefore, many surgeons prefer this method. However, the soft tissue fat layers in the face vary in thickness depending on the location, and the locations also vary depending on the development of facial bones. Thus, uni-layer thread insertion is difficult even for experienced surgeons. If the thread is inserted between the two fat layers or through the SMAS layer, the thread penetrates the lubricating layer, thereby diminishing the inter-layer mobility of the tissues.

Furthermore, anchoring structures, such as cog threads, cause tissue in each layer to be pulled toward one side, leading to increased tissue volume. The increased volume may be favorable depending on the surgeon's skill level and may be aesthetically desirable. However, multi-layer insertions mistaken as uni-layer insertions lead to an unwanted volume increase, resulting in prominent zygomatic bones and temporal asymmetry. We used the Vxil long lines and middle lines from Bistool. These threads feature press molded cogs, with higher tensile strength and lifting ability than cutting cogs [11,12]. The overlapping cogs characteristic of these threads ensures adequate fixation and tensile strength upon insertion, enabling robust traction of tissues. Tissue traction was higher with long lines than middle lines, as traction stability is enhanced with longer threads and more spikes through the fixation of more tissues [13]. In this study, we assessed changes in patients' satisfaction using the GAIS score at the 3-month and 6-month follow-ups. The participants stated that improvements were observed at 3-month (87.5%) and 6-month (79.2%). In 2017, Kang et al. reported that 87% of patients who underwent vertical lifting were satisfied at the 6-month follow-up [14]. In our

study, we asked the patients to rate their GAIS scale and did not directly assess their satisfaction, which might have contributed to the differences in results. However, we observed that the scores decreased over time. Two factors may be at play. First, the PDO threads are resorbed by the body, diminishing the effects of the lifting. Second, patients may become familiar with their changed faces over time, resulting in a recall bias regarding the effectiveness of thread lifting.

This study had cases of transient complications that were resolved over time. There were no cases of serious complications. In 2018, Gülbitti et al. conducted a systematic review and reported that swelling (up to 90.3%) and bruising (up to 93.5%) were the most common complications [1,7]. Furthermore, complications such as intractable pain (37.9%), skin dimpling (34.5%), palpable threads (27.6%), thread extrusion (13.8%), paresthesia (10.3%), and foreign still body reaction (6.9%) may occur [1,15]. As infection can lead to scarring, special precautions should be taken to prevent infections in minimally invasive plastic surgeries [1,4]. The risk for complications increases with an increasing number of threads during thread lifting [15]. Stringent infection control and understanding anatomical structures are essential to lower the incidence of complications. One limitation of this study was that we could not measure tissue displacement at a certain traction force. Tissue displacement according to the traction force is influenced by various factors, including differences in skin and soft tissue among individual patients, facial contours, and the degree of traction applied during thread insertion. We had one surgeon operate on all patients to reduce practitioner error. Subsequent studies should analyze the relationship between traction force and the extent of tissue movement. Thread lift generates lifting and volume expansion, but volume expansion has generally been expressed as a side effect. The present study is significant in showing satisfactory lifting and contouring outcomes as intended, using uni-layer insertion for lifting and multi-layer insertion for volume expansion. Furthermore, we assessed the GAIS score twice throughout the follow-up period to evaluate changes in patient satisfaction.

Conclusion

Even though there is no objective criteria for the effectiveness of thread lifting and standard technique, practitioners still need to choose the appropriate thread and procedure technique based on their research. Also they need to perfect their skills to minimize complications and boost patient satisfaction.

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