Rejuvenating the Face: An Analysis of 100 Absorbable Suture Suspension Patients

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Abstract

**Background:** Absorbable suture suspension (Silhouette InstaLift, Sinclair Pharma, Irvine, CA) is a novel, minimally invasive system that utilizes a specially manufactured synthetic suture to help address the issues of facial aging, while minimizing the risks associated with historic thread lifting modalities.

**Objectives:** The purpose of the study was to assess the safety, efficacy, and patient satisfaction of the absorbable suture suspension system in regards to facial rejuvenation and midface volume enhancement.

**Methods:** The first 100 treated patients who underwent absorbable suture suspension, by the senior author, were critically evaluated. Subjects completed anonymous surveys evaluating their experience with the new modality.

**Results:** Survey results indicate that absorbable suture suspension is a tolerable (96%) and manageable (89%) treatment that improves age related changes (83%), which was found to be in concordance with our critical review.

**Conclusions:** Absorbable suture suspension generates high patient satisfaction by nonsurgically lifting mid and lower face and neck skin and has the potential to influence numerous facets of aesthetic medicine. The study provides a greater understanding concerning patient selection, suture trajectory, and possible adjuvant therapies.

Level of Evidence: 4

and Drug Administration (FDA) approved thread lifting for this very purpose. Nonabsorbable barbed suture was introduced under the skin, hoisting the dermis to create a lifted appearance. This was short-lived though, as thread lifting lost FDA approval in 2007 due to serious complications associated with its use.

More recently, absorbable suture suspension (Silhouette InstaLift, Sinclair Pharma, Irvine, CA), has shown promise. This novel treatment employs an absorbable suture with bidirectional cones to improve facial rhytides. These biodegradable threads create a suspension system that addresses ptotic skin located primarily in the midface, jawline, and neck areas.

This study investigates our early experience using absorbable suture suspension. Specifically, we detail its efficaciousness, adverse effects, safety, and tolerability. To our knowledge, this is the largest series examining this novel modality in the United States.

METHODS

Patient Selection

We prospectively reviewed the first 100 treated patients, by the senior author (J.W.F.), with absorbable suture suspension alone for facial and neck aging between November 2015 and June 2016. Patients treated with absorbable suture suspension for ptotic skin of the mid and lower face or neck were included. Patients with advanced signs of aging, very thin skin, or if treated for facial volume loss at least 6 months prior, were not candidates for absorbable suture suspension and were excluded. Additionally, all included patients were evaluated pre-, three-, and six-months postprocedure using the Allergan Photometric Midface Volume Deficit Scale. This study adhered to the standards of the World Medical Association’s 1975 Declaration of Helsinki, including the revisions of 2000 and 2008. Consent for the procedure and included pictures were obtained.

Survey

Patients were asked to anonymously complete two surveys regarding their general experience being treated with absorbable suture suspension. The surveys were an electronic, multiple attempt format sent to all patients through SurveyMonkey (San Mateo, CA). The initial survey was sent at one week and consisted of six questions geared toward assessing patients’ experience and overall satisfaction with the procedure (Appendix A, available as Supplementary Material online at www.aestheticsurgeryjournal.com). The second survey sent at three months consisted of one question to assess the patients’ perception of efficacy (Appendix B, available as Supplementary Material online at www.aestheticsurgeryjournal.com).

Once the initial survey invitation was sent, no reminder emails were sent in follow up to survey nonresponders. All procedures were paid for by the patients and none were reimbursed for follow up or to take the surveys.

Independent Review

Patients were evaluated both pre- and postprocedure by three reviewers (two surgeons, one of which was the senior author, and a nurse practitioner). For concerns of conflict of interest, the senior author reviewed results for treatment purposes only and was done independently and was neither involved nor influenced the rating process of the other two reviewers. Patient photographs were evaluated both preprocedure and postprocedure both at two weeks and at three- and six-month follow up. At two weeks, each reviewer was looking for signs of vanity complications (eg, prolonged ecchymosis or edema). At three- and six-month follow up, reviewers were considering overall facial rejuvenation, adequacy of results, and improvement in midfacial volume deficits. Midfacial volume deficits and subsequent improvement were judged using the Allergan Photometric Midface Volume Deficit Scale (Figure 1), which is a validated 5-point scale, originally used to evaluate volumizing effects of hyaluronic acid fillers in the midface. Inadequate results were discussed and if could be improved upon, additional sutures were placed at no additional cost to the patient.

Suture

Absorbable suture suspension is a biodegradable suture that measures 26.8 to 30 cm long. Each thread is equipped with a 12-cm 23-gauge needle on each end. There is a 2-cm gap in the middle of the suture with two sets of bidirectional cones (either 4, 6, or 8 cones) and knots on either end, allowing for equal tension and weight distribution across the face (Figure 2). The cone and knot system is a significant component to the suture’s configuration, providing a 360-degree surface for effective anchoring points by fastening the suture to the subdermal fascia.

The sutures are composed of Polyglycolide/L-lactide (PLGA), a biodegradable and biocompatible polymer, while the cones are composed of Lactide glycolide (82% L-Lactic acid—18% Glycolic copolymer).

Procedure

With the patient sitting in repose, the desired vector of movement is identified and marked (Figure 3). The face is then cleansed steriley and injected with 0.5 cc of 1% Lidocaine with epinephrine (1:200,000) at each entry and exit site. For the mid and lower face, 8-cone sutures are used, separating the entry and exit points by 6-cm. For the neck, 12-cone sutures are used, separating the entry and
exit points by 9-cm. Initial access into the face is made with an 18-gauge pilot needle. The double-armed suture is then introduced into a subdermal plane and passed in opposing directions parallel to the desired vector of movement. Using gentle massage, the tissue is advanced over the suture’s cones taking care to avoid bunching of the skin. The needles, which pass through to exit points, are cut once the desired effect is achieved. Two to four sutures are used per side as necessary in order to achieve the desired amount of lift. Please see procedural video for markings,
placement, and manipulation (available as Supplementary Material online at www.aestheticsurgeryjournal.com).

RESULTS

A total of 100 treated patients underwent absorbable suture suspension between November 2015 and July 2016. There were 7-male and 93-female patients. The average age was 61.6 years (range, 41-87 years). See Table 1 for patient demographics. The 8 and 12 cone sutures were the primary threads placed in the majority of patients with an average number of 4.5 sutures placed in total. Of the 100 patients initially treated, 62% of patients had 8 cone threads placed in the midface, 54% of patients had 8 cone threads placed along the jawline, and 33% of patients were treated using 12 cone threads in the neck. See Table 2 for suture characteristics. All patients returned for follow up to assess initial changes.

All patients experienced peri-procedural edema that resolved within 24 to 48 hours. Other common side effects observed were pinpoint bleeding and minor ecchymosis. There were no instances of nerve damage or facial palsy. Postprocedure analgesia was managed with acetaminophen only. Narcotics were found to be unnecessary. No sutures required extirpation or broke after placement. On evaluation by the senior author, there were no signs of dimpling or excessive skin bunching. There were no complaints of cone palpability after the first week.

All patients were sent two anonymous “yes or no” questionnaires. The first questionnaire, sent at one week postprocedure, consisted of six questions that gauged patient satisfaction and subjective impressions (Appendix A). The second questionnaire, sent at three months, assessed satisfaction with one question (Appendix B).

Twenty-eight patients (28%) responded to the first survey. The majority of patients found the procedure to be tolerable (96%) with manageable discomfort (89%) and few minor side effects (eg, ecchymosis and edema [89%]). Most saw an immediate improvement in age related changes (68%) and were, overall, quite satisfied with their experience (79%) (Table 3). Forty-seven patients (47%) responded to the secondary survey and of those that responded, 83% felt that the treatment was effective in improving their age-related changes (Table 4).

The in-office review of the first 100 patients illustrated 91 patients with complete postprocedure photographic documentation, 9 patients had only early follow-up photographs. Of this group, no lingering edema and only mild visible ecchymosis was seen in 6.7% of patients (N = 6). Inadequate improvement between pre- and postprocedure was observed in 22.5% of patients (N = 20). Sixteen
patients underwent additional suture placement for result enhancement. Of the 20 inadequate responders, all were for neck concerns and 16 of these patients underwent two additional suture placements total in the neck area only. In regards to the Allergan midface volume deficit, the starting deficit of our cohort ranged from 1 to 5, with an average starting deficit of a 3 (moderate deficit) (Table 5). The ending deficit of our cohort ranged from 0 to 4, with an average ending deficit of a 2 (mild deficit). On average, facial volume deficits improved by one degree on the scale. Further analysis illustrated that 15 patients (16.5%) experienced no improvement, 64 patients (70.3%) experienced one degree of improvement, 12 patients (13.2%) experienced two degrees of improvement, and no patients experienced three, four, or five degrees of improvement (Table 6).

Figures 4 and 5 represent patients who underwent absorbable suture suspension.

**DISCUSSION**

As we age, the facial anatomy undergoes largely predictable changes. The skin tends to become thinner with loss of elasticity leading to rhytides, which is often compounded by photo-aging. Ptosis of various facial components adds to the aged appearance of the face and neck. The face has several distinct fat compartments, which in youth are nondiscernible. However, with aging these compartments become more evident due to fat descent, selective atrophy, and attenuation of the intervening retaining ligaments. The facial skeleton tends to change dramatically with significant resorption around the orbit, maxilla, and prejowl area of the mandible. These changes tend to interplay causing the face to exhibit a “triangle” appearance emphasized by midface volume loss, deepening of the naso-labial folds, and marionette lines, along with significant jowl formation, instead of the inverted triangle of youth.

At present, the SMAS rhytidectomy is the gold-standard treatment for moderate to severe ptosis of the skin and soft tissue in the midface and neck. However, there has been a recent trend by patients, particularly younger patients, to opt against surgery because of its potential complications and prolonged recovery. This is nowhere more evident than in the data for surgical vs nonsurgical facial rejuvenation released by the American Society for Aesthetic Plastic Surgery (ASAPS). According to ASAPS, between 1997 and 2016, surgical facial rejuvenation saw a percent increase of 19.5%, while nonsurgical facial rejuvenation procedures saw a 6956.6% increase. This in turn has led to the search for and development of less invasive methods to improve facial aging, particularly skin ptosis.

In 2004, the FDA approved thread lifting (Contour Lift, Aptos Lift) for mid and lower facial rejuvenation. These were permanent, polypropylene, barbed sutures intended to catch and lift the dermis in a unidirectional fashion, allowing for fixation of the skin, and to a lesser extent, the soft tissue in an elevated position. Despite their elegant approach, these barbed sutures caused significant

**Table 1. Patient Demographics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>No. of patients</td>
<td>100</td>
</tr>
<tr>
<td>Female</td>
<td>93</td>
</tr>
<tr>
<td>Male</td>
<td>7</td>
</tr>
<tr>
<td>Age of patients (years)</td>
<td></td>
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<tr>
<td>Average</td>
<td>61.6</td>
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<tr>
<td>Range</td>
<td>41-87</td>
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**Table 2. Suture Characteristics**

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Sutures placed (total)</td>
<td>4.5</td>
</tr>
<tr>
<td>Range</td>
<td>2-7</td>
</tr>
<tr>
<td>Location of sutures placed, %</td>
<td></td>
</tr>
<tr>
<td>Midface</td>
<td>62</td>
</tr>
<tr>
<td>Jawline</td>
<td>54</td>
</tr>
<tr>
<td>Neck</td>
<td>33</td>
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**Table 3. Responses to Survey 1**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response yes:no (yes %)</th>
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<tbody>
<tr>
<td>I found absorbable suture suspension to be tolerable</td>
<td>27:1 (96%)</td>
</tr>
<tr>
<td>I could see the results of absorbable suture suspension immediately</td>
<td>19:9 (68%)</td>
</tr>
<tr>
<td>I had manageable discomfort (no medication required to make better) during and after absorbable suture suspension</td>
<td>25:3 (89%)</td>
</tr>
<tr>
<td>I had minimal bruising or swelling after absorbable suture suspension</td>
<td>25:3 (89%)</td>
</tr>
<tr>
<td>Overall, I am satisfied with my results from absorbable suture suspension</td>
<td>22:6 (79%)</td>
</tr>
<tr>
<td>I would recommend absorbable suture suspension to family and friends</td>
<td>23:5 (82%)</td>
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**Table 4. Response to Survey 2**

<table>
<thead>
<tr>
<th>Question</th>
<th>Response yes:no (yes %)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I found absorbable suture suspension to be an effective treatment at improving age related change:</td>
<td>39:8 (83%)</td>
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complications. Patients complained of severe pain, skin dimpling, and demonstrated foreign body reactions.\textsuperscript{17-20} Also, cutting the suture to create the barbs left the overall suture weakened leading to breakage and decreased longevity (3-6 months).\textsuperscript{21} Due to their permanent nature, infection and extrusion were also common and many physicians found them extremely difficult to remove. These issues led to their eventual removal from the market in 2007.

The shortcomings of barbed suture coupled with the success of Silhouette Soft (Sinclair Pharma, London, UK) in Europe, facilitated the innovations seen in the Silhouette InstaLift, for the US market. Silhouette Soft debuted in Europe in 2013 and over 130,000 procedures have been performed since.\textsuperscript{22} Silhouette Soft, a uniquely formulated suture material (Poly-L-lactic acid [PLLA]) along with the patented knot and cone system has significantly aided European physician’s ability to tighten ptotic skin through both its physical and chemical structure. Given these lessons, for Silhouette InstaLift in the United States, the first task was to make the suture absorbable and fully biodegradable by using Polyglycolide/L-lactide (PLGA), reducing the risk of infection or the need for suture removal. Secondly, by utilizing the biodegradable cones and knots system, instead of barbs, the structural integrity of the suture was assured along with decreased risk of dimpling, extrusion, or palpability.\textsuperscript{23} These sutures do not rely on anchoring of the dermis like their predecessor, but rather capturing the retaining ligament anatomy and lifting in a parachute fashion the various compartments of the face and neck. Additionally, due to its composition, the absorbable suture lift helps to recreate the inverted triangle of youth not only by lifting ptotic tissue but also increasing collagen production in the midface area. PLGA and Lactide glycolide have been cited to stimulate new collagen development.\textsuperscript{24} It is thought that the surrounding collagen growth encapsulates the cones and adjacent knots to help biologically fixate the structure. By doing so, the suture adds lost volume to the cheek area over time, thus generating a longer-lasting smooth, contoured appearance and based on the total collagen production and fat content, along with outcomes from the European data, it is believed that the results begin to peak between 3 and 6 months and may last anywhere from 18 to 36 months.\textsuperscript{6,24} As evidenced by the analysis of the Allergan Midface Volume Deficit Scale, due to midface lifting and possible collagen production, the majority of patients will experience one to two degrees of improvement, however, patients with significant deficits may require further volume enhancement with fat or filler, to boost the final results.

In all metrics, absorbable suture suspension appears to outperform its predecessors. Lycka and colleagues investigated barbed sutures and illustrated above satisfactory results in 152 of 350 patients (43\%).\textsuperscript{25} In comparison, in our series, patients reported an overall satisfaction rate with absorbable suture suspension of 79\%, with 83\% reporting improvements in age-related changes and 82\% being willing to recommend the procedure to friends or family.

Regarding revisions, Lycka found a total of 52 patients (15\%) required revisions including removal or fixing of asymmetry.\textsuperscript{25} In contrast, we found in our survey that 32\% of patients saw no immediate result, however, this number decreased to 17\% at three months. To more fully characterize these results, we also evaluated this parameter internally. Our review found that 22.5\% of patients illustrated inadequate correction initially, which improved with additional sutures placed in the neck. Of note, in our study, 89\% of patients reported minimal to no bruising or prolonged edema, which is in agreement with our observed bruise rate of only 6.7\%. Additionally, there were no cases of infection requiring suture removal and there were no asymmetries requiring revision.

In April 2015, the FDA approved absorbable suture suspension for the on-label indication of midface suspension in order to fixate the cheek subdermis in an elevated position. This was initially approved with the need to anchor the suspension suture with a permanent suture. In June 2017, the FDA revised the indication to remove the absolute need for permanent, open suture fixation, which is consistent with our experience and those abroad. The European data were based on one to two sutures placed in the midface and/or neck. If neck suspension was deemed necessary, a suture was placed in a “hammock” fashion, centered at the submental region extending to the postauricular area. Our suture placement process has continually

<table>
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<th>Table 5. Breakdown of Cohort by Initial Midfacial Volume Deficit</th>
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<tbody>
<tr>
<td>Initial deficit</td>
</tr>
<tr>
<td>0 1 2 3 4 5</td>
</tr>
<tr>
<td>No. of patients (%) (n = 91)</td>
</tr>
<tr>
<td>0.0 2.2 18.8 47.2 26.6 2.2</td>
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<table>
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<th>Table 6. Breakdown of Cohort by Degree of Improvement of Midfacial Volume Deficit</th>
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<tr>
<td>Degree of improvement</td>
</tr>
<tr>
<td>0 1 2 3 5</td>
</tr>
<tr>
<td>No. of patients (%) (n = 91)</td>
</tr>
<tr>
<td>16.5 70.3 13.2 0.0</td>
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Figure 4. A 46-year-old female with moderate midfacial volume deficit (A3) with ptosis, moderate jowling, and submental laxity who underwent placement of 2 sets of 8-cone sutures per side. One suture placed along the midface (nasolabial fold to temporal sideburn) in a vertical vector and one placed along the jawline (marionette line to temporal sideburn) in a vertical vector. Follow-up photographs were taken at 6 months. (A) Pre-procedure frontal view illustrating midfacial volume deficit and loss of inverted triangle of youth. (B) Follow-up frontal view illustrating improved midfacial volume and improvement in midface ptosis. (C) Preprocedure left three-quarter view illustrating moderate jowling. (D) Follow-up left three-quarter view illustrating improved streamline of the jaw with jowl reduction. (E) Preprocedure left profile view illustrating moderate submental laxity. (F) Follow-up left profile view improved submental laxity and tighter cervical-mental angle.
Figure 5. (A, C, E) Preprocedure and (B, D, F) follow-up photographs taken at 12 weeks of this 54-year-old woman with facial aging who underwent placement of 3 sets of 8-cone sutures per side. On each side, one suture was placed in the midface, one at the jawline to the mastoid, and one along the lateral neck (see Figure 3).
evolved over time, which explains our revision rates. Particularly in the neck, our process initially moved away from the submental hammock to a U-stitch anchored at the postauricular hairline to now using a multivector approach using a straight-line technique along the jawline and lateral neck (Figure 3). Unlike the European data, which are based upon one to two sutures for the face and neck, we are typically now using three to four sutures for the same regions with improved results.

The success of any nonsurgical tool is based upon proper indications and use. In completing this study, it is clear that absorbable suture suspension alone may not achieve a surgical result, patients must have reasonable expectations when choosing a less invasive approach and preprocedure planning is of utmost importance. Absorbable suture suspension should be highly considered in those with mild to moderate skin laxity, in men seeking facial rejuvenation but wanting to avoid potential facial hair distortion, and those who may have contraindications to surgery such as vascular compromise and impaired wound healing secondary to hypertension, diabetes mellitus, or tobacco abuse. In the proper patient, absorbable suture suspension is a viable option as compared to surgery with an improved risk profile, as evidenced by the following table, representing a qualitative comparison of modalities for ptotic skin reversal and facial aging (Table 7).

The study illustrates a positive response to absorbable suture suspension. Postprocedure, the majority of patients characterized the procedure as tolerable, immediately effective, and manageable and the majority of patients were consistently pleased by the natural enhancements it provided. Overall, the study is a valid representation of absorbable suture suspension and patient impressions. The evidence provided helps to enhance the knowledge base of aesthetic surgeons, as it provides a modality to improve facial aging, which is safe, effective, and tolerated well by most coupled with reduced risk of complications and recovery time as compared to traditional rhytidectomy or its barbed suture predecessor.

Admittedly, the study is not without limitations. First, suture placement technique continues to evolve in search of the perfect vector placement for each individual patient and specific issue, which is the subject of ongoing study. Secondly, follow up for our cohort was only out to six months, which limits our ability to substantiate the claim of a lasting effect up to 18 to 36 months. However, follow up remains ongoing and is a subject for further research. Lastly, our study is of limited power due to incomplete compliance of our survey responders, as evidenced by less than total cohort questionnaire response rates. However, as illustrated by Nulty and other authors, for an online survey, the average response rate is 33%, 26-30 Our response rates of 28% for the first survey and 47%, for the second survey are by no means perfect, but are considered in the acceptable range for a survey of this nature.

Future research will look to answer remaining questions about absorbable suture suspension, particularly its place in the continuum of noninvasive modalities and how that will affect result longevity. In 2012, we introduced the concept of stackable therapies or using multiple nonsurgical therapies in a single setting to approach a surgical result.31,32 In our practice, we are starting to combine absorbable suture suspension with other modalities (eg, energy-based therapies [micro-focused ultrasound and laser]), as well as, neuromodulator, filler, and fat transfer, in the same setting. It is currently thought that as patients age through absorbable suture suspension, ptotic improvement will last around 18 months, however, it is our belief that with improved methods of placement, number of sutures placed and used within the stackable approach, relative results may potentially last up to 36 months and beyond.

**CONCLUSION**

The aesthetic surgeon must be in tune to the rapidly changing trends in the field of cosmetic medicine. Noninvasive and minimally invasive procedures are gaining traction due to their synergistic effects, limited costs, and improved safety profiles. Absorbable suture suspension is currently the newest minimally invasive treatment for ptotic facial skin, has been shown to have an improved safety and efficacy profile over barbed suture thread lifting, and should be considered a workhorse in nonsurgical lifting of ptotic facial skin.

**Supplementary Material**

This article contains supplementary material located online at www.aestheticsurgeryjournal.com.
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REFERENCES