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Short-term Treatment Outcomes of Facial Rejuvenation Using the Mint Lift Fine

Hyoung-Jin Moon, MD*
Dooyeol Chang, MD†
Won Lee, MD, PhD‡

Background: Threadlifts are classified as absorbable or nonabsorbable, natural or synthetic, and multifilament or monofilament ones, each of which has its own merits and demerits. We placed a novel absorbable polydioxanone monofilament threadlift (Mint Lift Fine; HansBiomed Co. Ltd., Seoul, Korea) in the subcutaneous fat compartment for facial rejuvenation in patients with nasolabial folds, nasojugal groove, marionette lines, or sagging jowl. Here, we describe its short-term treatment outcomes in a retrospective consecutive series of 21 patients.

Methods: A total of 21 patients (n = 21) were evaluated; their treatment outcomes were described based on a comparison between preoperative and postoperative findings and Global Aesthetic Improvement Scale (GAIS) scores were assessed at 6 months. This is accompanied by analysis of the incidence of postoperative complications.

Results: The patients had a mean GAIS score of 3.62 ± 0.84 points, which corresponds to "Much improved" or "Very much improved." Moreover, there were no significant differences in the GAIS scores between the target sites (midface and lower face: 3.78 ± 1.13; lower face: 3.43 ± 0.50; and midface: 3.60 ± 0.49; $P > 0.05$). Furthermore, there were a total of 4 cases (19.0%) of postoperative complications, all of which were spontaneously resolved within a maximum period of 4 months.

Conclusions: We describe short-term treatment outcomes of facial rejuvenation using the Mint Lift Fine in patients with nasolabial folds, nasojugal groove, marionette lines, or sagging jowl. But further large-scale, prospective, multicenter studies with long periods of follow-up are, therefore, warranted to establish our results.
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INTRODUCTION

In recent years, there has been an increasing demand for a younger, more attractive appearance as individuals have experienced aging.[1] It would, therefore, be mandatory for aesthetic surgeons to obtain a complete understanding of individual differences in the anatomic and physiologic aspects *and* severity of the aging process.[2] But aesthetic surgeons should also consider the possibility of factors affecting patients' decision on certain types of facial rejuvenation procedures; these include the degree of patient expectation, time to recovery, and patients' economic status.[3,4]

The superficial musculoaponeurotic system (SMAS) was first described by Mitz and Peyronie[5] in 1976. Since then, there has been a great evolution in facial rejuvenation procedures, extending from skin-only rhytidectomy to a wide variety of soft tissue repositioning and SMAS lift adaptations.[5,6]

Over the past decade, minimally invasive facial rejuvenation techniques have become a mainstream modality; their advantages include shorter operation time, opportunity for office-based aesthetic procedure, and lower incidences of postoperative complications. This has been followed by current cosmetic practices providing patients with minimal time to recovery and maximal patient convenience.[7] Thus, facial rejuvenation techniques using threads have been frequently performed to lift brow,

*From the *BeUp Aesthetic Plastic Surgery Clinic, Seoul, South Korea; †Change Clinic, Seoul, South Korea; and ‡Yonsei E1 Plastic Surgery Clinic, Anyang, South Korea.*

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midface, jowl, and neck, and their treatment outcomes have been well described in the literature.[8–11]

The barbed suture was first used to lift the ptotic facial tissue by Sulamanidze et al.[12] Since then, its efficacy and safety have been reported in published studies, followed by the emergence of variants of the original antiptosis suture (Aptos) threads. But facial rejuvenation techniques using threads share a similarity; cogged threads are inserted in the subcutaneous layer, pulled to achieve the desired skin lift and secured and then trimmed at the entry point.[11,13–15]

Conventional types of face-lifting procedures are characterized by dissection of facial layers followed by maximal traction of the dissected plane and fixation of it to the desired location.[16] Moreover, previous "long-thread" types of threadlifts share similar procedures to conventional face-lifting procedures in that threads are anchored at the deep temporal fascia and then lift the skin from their end. Such conventional procedures are disadvantageous, however, in *not only* that they frequently cause complications due to skin traction, such as skin dimple or irregularities, *but also* that their effects are not sustained because of the gravity.[8,13]

Threadlifts are classified as absorbable or nonabsorbable, natural or synthetic, and multifilament or monofilament ones, each of which has its own merits and demerits.[17,18]

Characterized by the resistance to biodegradability, nonabsorbable threadlifts include natural (surgical steel, silk, cotton, and linen) and synthetic nonabsorbable ones (nylon, polypropylene, and polybutester).[17–20] Their advantages include strength, a lack of premature breakage, and a minimal risk of inflammatory responses.[20] On the other hand, absorbable threadlifts are characterized by a loss of tensile strength within 60 days with little or no tissue reaction at a predictable rate and include natural surgical gut, polygalactin (Vicryl), polyglycolic acid (Dexon), glycolic acid (Maxon), and polydioxanone (PDO).[18,21] Surgeons may prefer the use of absorbable threadlifts to their nonabsorbable counterparts because of its spontaneous biodegradability.[19]

The Mint Lift (HansBiomed Co. Ltd., Seoul, Korea) is a violet-colored, absorbable PDO monofilament threadlift with a wire length of 43 cm and an USP size of 0. Classified as a class IV medical device, it has properties such as a transparency seen on postoperative month 1, bidirectional helical barbs providing a initial strong skin anchorage without an attachment of the yarn to the needle. Moreover, it is inserted initially using a curved needle (5/8) and then later using an 18-G blunt cannula, for which the disposable, external trocar is concomitantly used.[14]

Diverse types of the Mint Lift products are available to meet needs of both aesthetic surgeons and patients; these include the Mint Lift 43, 17, Fine and Easy. Of these, the Mint Lift Fine is equipped with an 18-G W-type blunt cannula rather than an L-type one. It is a thin threadlift with an USP size of 2-0; it is released for facial rejuvenation in patients with thinner skin. It is equipped with a 360° rotational barb that prevents the cannula from being trapped. That is, it is often noted that even integral types of threadlift with a 180° barb might be trapped with the cannula without being separated from it. A frontal view of the threadlift with a 360° rotational barb shows a near-round shape of barb; its passage through a tube of cannula would be easier. The Mint Lift Fine is characterized by tightening and strengthening of the fixation point with the absorbance of its barb. This may eventually contribute to sustainability of treatment effects.

Given the above background, we placed the Mint Lift Fine in the subcutaneous fat compartment for facial rejuvenation in patients with nasolabial folds (NLFs), nasojugal groove, marionette lines, or sagging jowl. Here, we describe its short-term treatment outcomes in a retrospective consecutive series of 21 patients.

METHODS

Study Patients and Setting

The current single-center, case series study was conducted in a total of 23 patients who had been treated at the BeUp Plastic Surgery Clinic in Seoul, Korea, between January of 2017 and May of 2018. We included the patients with NLFs, nasojugal groove, marionette lines, or sagging jowl; those undergoing subcutaneous fat repositioning for facial rejuvenation using the Mint Lift Fine; those with mild-to-moderate skin flaccidity; and those with available follow-up data.[14] But we excluded the patients lost to follow-up (n = 2).

We, therefore, evaluated a total of 21 (n = 21) patients in the current study; informed consent was waived due to its retrospective nature. The current study was conducted in compliance with the relevant ethics guidelines.

Treatment Protocol

For facial rejuvenation using the Mint Lift Fine, both entry and exit points were determined in the temporal region of the face. (**See Video [online],** which displays both entry and exit points were determined in the temporal region of the face for facial rejuvenation using the Mint Lift Fine.) We drew a triangle formed by 3 lines: (1) the Pitanguy line, identifying the temporal branch of the facial nerve which runs from 0.5 cm below the tragus to 1.5 cm above the lateral eyebrow; (2) the horizontal line along the superior border of the zygomatic arch; and (3) the vertical line originating from the temporal process (Fig. 1A). In the triangle, 4 entry points were determined below and in parallel with the Pitanguy line, thus marked as En1, En2, En3, and En4. Subsequently, 4 exit points were determined in the center of the target fat compartment, thus marked as Ex1 (nasolabial fat), Ex2 (upper jowl fat), Ex3 (lower jowl fat), and Ex4 (middle cheek fat) (Fig. 1B).

We obtained sufficient visual fields using the hydrodissection technique in the subcutaneous layer and thereby prevent possible damages to vessels or nerves, such as superficial temporal artery/vein and facial nerve, in the temporoparietal fascia.[22–24] Surgical procedure was performed under local anesthesia, for which 2% lidocaine containing 1:200,000 epinephrine was injected to the

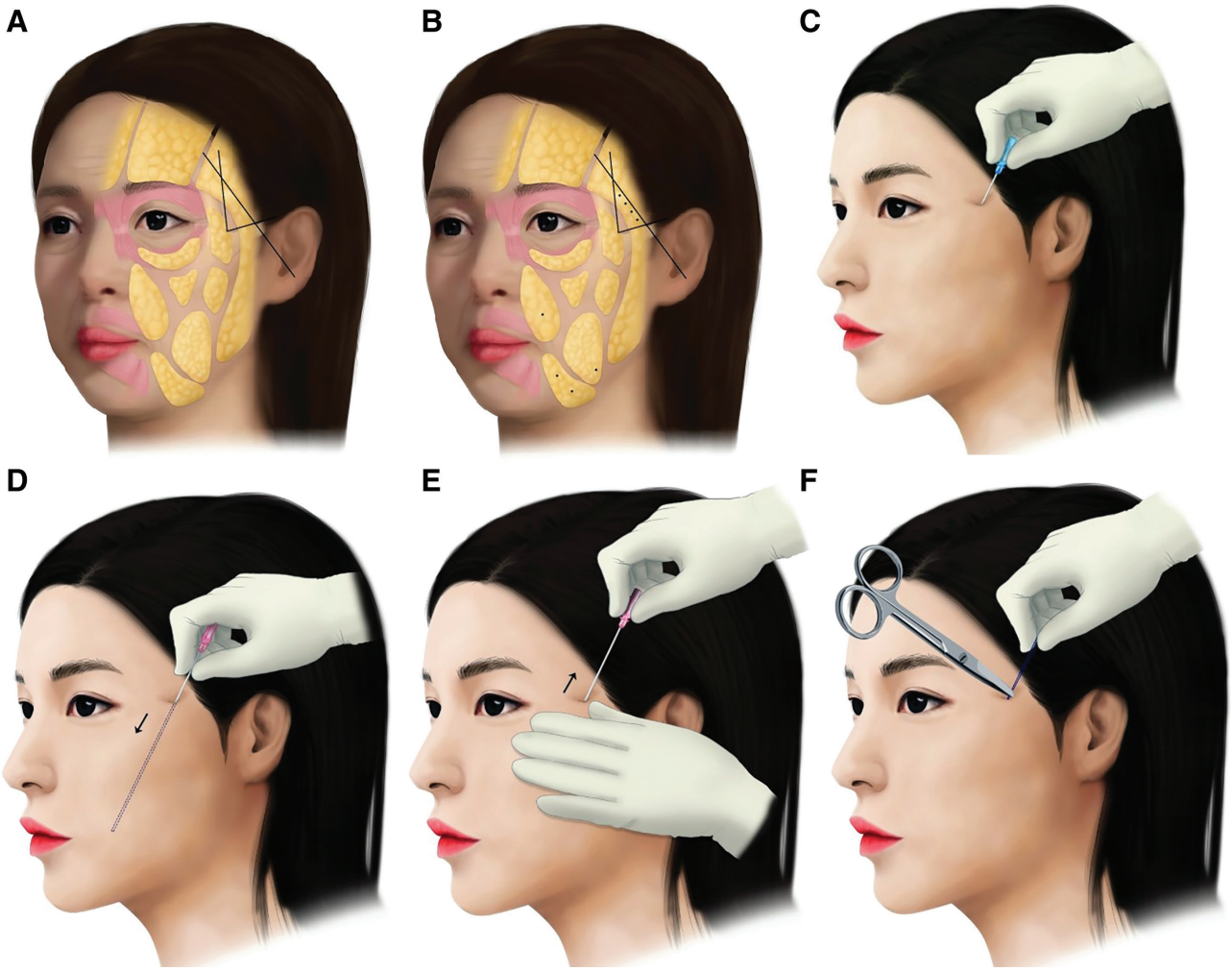

Fig. 1. Treatment protocol. A, In the temporal area, the entry point was determined. This was followed by the drawing of a triangle formed by the Pitanguy line, the horizontal line along the superior border of the zygomatic arch, and the vertical line from the temporal process. B, In the triangle, 4 entry points were determined below and in parallel with the Pitanguy line. Subsequently, 4 exit points were determined in the center of the target fat compartment. C, In each entry point, a hole was made using a 18-G needle. D, After the cannula was inserted, it was advanced through the subcutaneous layer and then reached the distal part of the target fat compartment. E, Although the cannula was being held and then fixed with one hand, it guided the displacement of the soft tissue to the vertical direction using the opposite hand. F, Following the removal of the cannula, when the proximal part of the remaining thread was protruded outside of the entry site, it was cut and then removed.

entry point. Thus, a sufficient amount of anesthetics (>1 mL) were injected to the subcutaneous layer in the temporal area where the entry point was determined.

In each entry point, a hole was made using a 18-G needle (Fig. 1C). Along the subcutaneous layer, the Mint Lift Fine was displaced from the En1, En2, En3, and En4 to the Ex1, Ex2, Ex3, and Ex4 in the corresponding order (Fig. 1B). After the cannula was inserted, it was advanced through the subcutaneous layer and then reached the distal part of the target fat compartment (Fig. 1D). Because it has a blunt tip, its placement at the desired location was monitored. Although the cannula was being held and then fixed with one hand, it guided the displacement of the soft tissue to the vertical direction using the opposite hand (Fig. 1E). Following the removal of the cannula, when the proximal part of the remaining thread was protruded outside of the entry site, it was cut and then removed (Fig. 1F). In severe cases, multiple threads may also be used for the same entry point. Each target fat compartment was displaced toward the entry point. The residual thread was removed.

Postoperatively, the patients received a 3-day course of antibiotic therapy that was implemented according to the recommendations of the Korean Health Insurance Review and Assessment Service. Then, they had an ice pack applied to the surgical site for 1 day for the purposes of preventing the occurrence of swelling and bruise. They were also recommended to wear a facial garment for 3 weeks and to practice making facial expressions and opening the mouth.

Our clinical series of the patients were regularly followed up at a 6-month interval.

Patient Evaluation and Criteria

Treatment outcomes were described using a serial photography performed preoperatively and at 6 months. Moreover, the patients were evaluated for the Global Aesthetic Improvement Scale (GAIS) scores measured by 2 treating physicians, as previously described.[25] Moreover, the GAIS scores were compared between the target sites using the repeated measures analysis of variance and Duncan's post hoc analysis. A P value of <0.05 was considered statistically significant. Furthermore, the incidence of postoperative complications was analyzed.

All data were expressed as mean with range, number with percentage, or mean ± SD, where appropriate.

RESULTS

Baseline Characteristics of the Patients

A total of 21 patients (2 men and 19 women; mean age, 49.24 ± 6.69 years of age) were followed up during a mean period of 6.28 ± 0.32 months. All the patients had mild-to-moderate skin flaccidity. Their baseline characteristics are represented in Table 1.

Treatment Outcomes

After the treatment with the Mint Lift Fine, there were 3 "Very much improved" cases, 9 "Much improved cases," 7 "Improved" cases, and 2 "No change" cases. This showed a mean GAIS score of 3.62 ± 0.84 points. Distribution of the GAIS scores was shown in Table 2 and Figure 2. Moreover, there were no significant differences in the GAIS scores between the target sites (midface and lower face: 3.78 ± 1.13; lower face: 3.43 ± 0.50; and midface: 3.60 ± 0.49; $P > 0.05$).

The representative case is illustrated in Figure 3.

Overall, there were a total of 4 cases (19.05%) of postoperative complications (Fig. 4). That is, there was 1 case (4.76%) of depression at the entry point, which was resolved with a soft massage within 4 weeks. There were 2 cases (9.52%) of irregularities on the skin, which was resolved within 3 weeks. There was 1 case (4.76%) of facial asymmetry; the corresponding patient received additional treatment within 3 weeks thereafter. In this patient, the remaining thread was exposed at the distal end, which was spontaneously resolved 4 months thereafter. There were no changes in skin color due to the insertion of a threadlift because it was inserted at a sufficient depth below the skin.

Table 1. Baseline Characteristics of the Patients (n = 21)

Variables	Values
Age (y)	49.24 ± 6.69 (35–62)
Sex (male-to-female ratio)	2:19
Length of follow-up period (mo)	6.28 ± 0.32 (6–7)
Causative conditions, n (%)	
NLFs + nasojugal groove + marionette lines + sagging jowl	7 (33.33)
Marionette lines + sagging jowl	6 (28.57)
NLFs + nasojugal groove	5 (23.81)
Nasojugal groove + marionette lines + sagging jowl	2 (9.52)
NLFs + marionette lines + sagging jowl	1 (4.77)
Sites of treatment, n (%)	
Midface and lower face	9 (42.86)
Lower face	7 (33.33)
Midface	5 (23.81)

Values are mean with range or number with percentage, where appropriate.

Table 2. GAIS Scores

Variables	Values
GAIS	
Very much improved (5 points)	3 (14.29)
Much improved (4 points)	9 (42.86)
Improved (3 points)	7 (33.33)
Unchanged (2 points)	2 (9.52)
Worsened (1 point)	0 (0.00)
GAIS scores	3.62 ± 0.84

Values are number with percentage or mean ± SD, where appropriate.

DISCUSSION

Rejuvenation is literally referred to as restoration of youth, and it is commonly used for patients experiencing aging-related changes in color, quality, and elasticity of the skin. Its treatment goals are to reduce winkles and to tighten the aging skin.[26,27] Noninvasive or minimally invasive rejuvenation procedures are superior to their invasive counterparts in that their advantages include less pain, prompt return to daily lives, short recovery time, and reduced risks of adverse events. Therefore, there is an increased number of patients who are in need of noninvasive or minimally invasive procedures of skin rejuvenation.[28,29] Skin rejuvenation in the face is performed to restore changes in the facial skin due to aging process that is characterized by a progressive increase in the laxity of skin and soft tissue, superficial skin changes, and volume loss.[30]

A threadlift is used for facial rejuvenation, whose target sites include lower face, jaw line, malar fat pad, and midface. Its indications have been extended to lifting of eyebrow, neck, and submental region.[31] Still, controversial opinions exist regarding sustainability of its treatment effects.[30] Rachel et al[32] reported an incidence of early recurrence of 45% according to a retrospective analysis of the 29 patients receiving the ContourLift (Surgical Specialties Corp., Reading, PA), thus maintaining that its treatment outcomes were unsatisfactory. On the other hand, Kaminer et al[33] showed that treatment effects were sustained during a mean period of 11.5 months in a retrospective consecutive of 20 patients receiving the ContourLift (Surgical Specialties Corp.). Thus, the lack of sustainability of treatment outcomes has been suggested as a demerit of a threadlift; Abraham et al[34] contradicted its effectiveness for facial rejuvenation *not only* because its treatment outcomes could not be sustained *but also* because it has no volumetric effects. Indeed, a threadlift is solely used to alter the position of the soft tissue on the superficial plane.[34–36]

Our clinical series of the patients had a mean GAIS score of 3.62 ± 0.84 points, which corresponds to "Much improved" or "Very much improved." The efficacy and safety of Mint Lift were previously reported. In more detail, Yarak and de Carvalho[14] performed a minimally invasive bidirectional facial rejuvenation procedure using

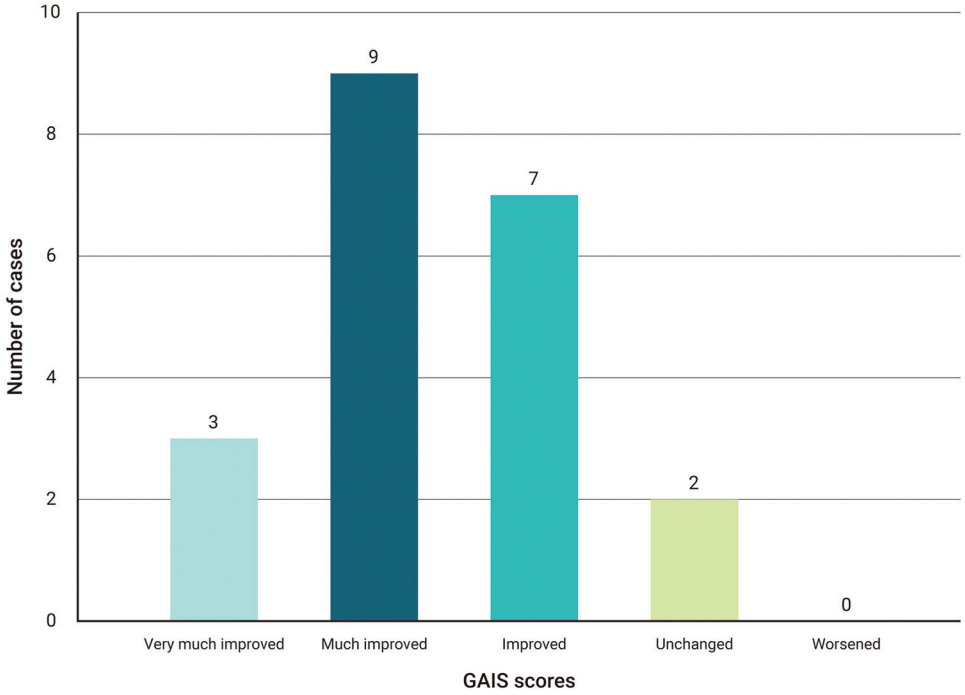

Fig. 2. Distribution of the GAIS scores. Postoperatively, our clinical series of the patients achieved a mean GAIS score of 3.62 ± 0.84 points.

Fig. 3. Illustrative case. A, A 39-year-old woman visited us with a chief complaint of sagging jowl, who received a treatment using the Mint Lift Fine. B, At 6 months postoperatively, the patient achieved a Global Aesthetic Improvement Score of 2, which corresponds to "Improved." The patient presented with no postoperative complications.

the Mint Lift to improve NLFs and mandibular contour in a total of 6 patients with skin sagging, thus demonstrating its efficacy and safety. These authors also noted that patients with mild-to-moderate ptosis, malar fat ptosis, or severe NLFs were indicated in the procedure using Mint Lift.[14] Moreover, Yeo et al[15] performed a unidirectional face-lifting with the use of Mint Lift in a total of 144 women with poor skin elasticity, thus reporting that only non-serious complications occurred following its use but they were resolved. Furthermore, Baek et al[37] conducted a 24-week, single-center, single-arm, pre–post test design, open-label clinical trial to assess it using the Wrinkle Severity Rating Scale and GAIS in patients with deep NLFs or lower facial drooping. According to these authors, the baseline Wrinkle Severity Rating Scale and the degree of its improvement, as measured by the independent observer, were 3.30 ± 0.45 at baseline and –1.20 ± 0.45 at 24 weeks. They also showed that the final GAIS score at 24 weeks was 1.85 ± 0.44 by the investigators and 1.84 ± 0.73 by the patients.[37] In our series, the patients achieved a mean GAIS score of 3.62 ± 0.84 points, as measured by the investigators, which corresponds to "Much improved" or "Very much improved." Taken together, these results indicate that the Mint Lift Fine showed an improved aesthetic outcome when compared with its former generation counterparts. In addition, there were no significant differences in the GAIS scores between the target sites.

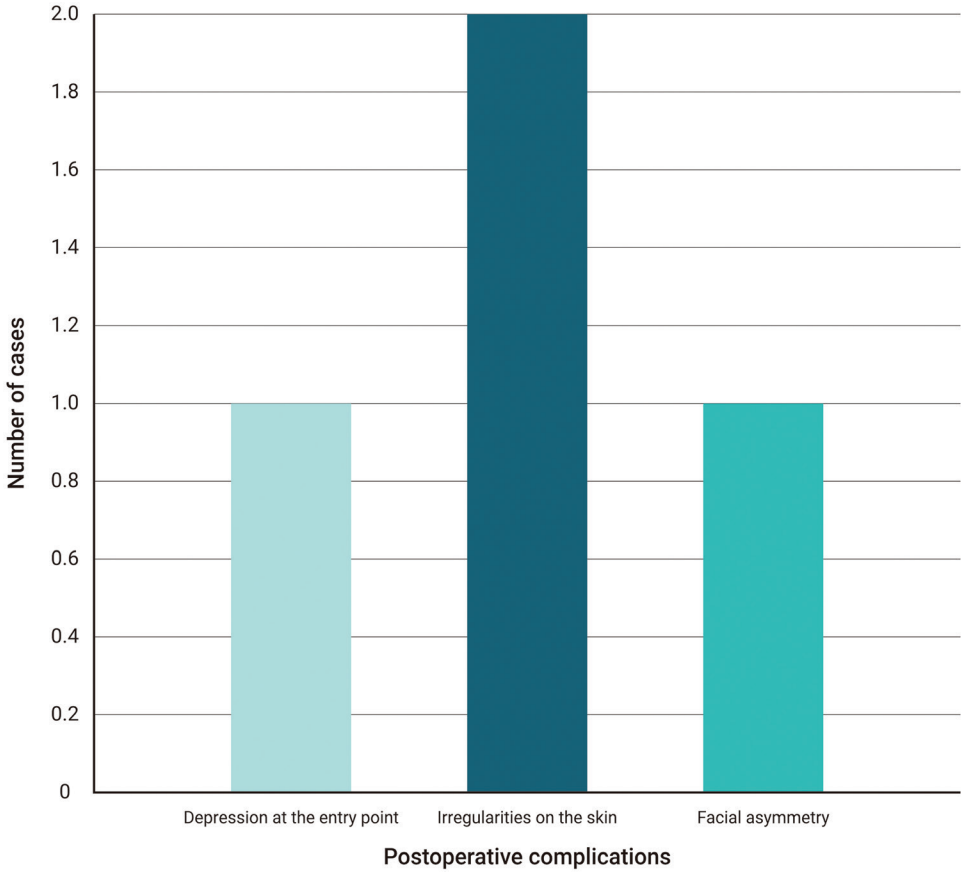

Fig. 4. Postoperative complications. In our series, there was 1 case (4.76%) of depression at the entry point, 2 cases (9.52%) of irregularities on the skin, and 1 case (4.76%) of facial asymmetry, all of which were spontaneously resolved within a maximum period of 4 months.

The previous study confirmed the safety of Mint Lift; Baek et al[37] reported occurrences of only a few self-limited minor complications, such as pustule formation, pain, swelling, subjective discomfort of tightness, and skin dimpling, without serious treatment emergent adverse effects.[37]

In our series, there were a total of 4 cases (19.05%) of postoperative complications, all of which were spontaneously resolved within a maximum period of 4 months. This was closely associated with advantages of the Mint Lift Fine, such as a simplicity of the procedure, a low risk of iatrogenic tissue injuries, the use of specialized cannula and absorbable sutures, and variability in the depth of cannula insertion. According to a review of literatures, complications of a threadlift have been described; these include a temporary feeling of tightness, transient neuropathy, and damages to the parotid duct or branches of the regional nerves.[38] According to Sulamanidze and Sulamanidze[39] and Sulamanidze et al,[40] there were skin dimpling (14.6%), hematoma/hemorrhage (9.5%), and hypercorrection (9.5%) in 157 patients receiving the Contour threads who were followed up during a period of 2.5 years.[39,40] Moreover, Wu[41] reported that there were infection (4.9%), skin dimpling (4.9%), thread migration (7.8%), and pain and palpation of a threadlift (11%) in a total of 102 patients receiving the Aptos thread.

The Mint Lift may be combined with other treatment modalities. Bae et al[30] conducted a retrospective study to evaluate the efficacy of the Mint Lift combined with liposuction in a total of 27 patients (n = 27) using both GAIS (1 = "Very much improved" and 5 = "Worsened") and patient-reported satisfaction scores (1 = "Unsatisfactory" and 4 = "Very satisfactory"), thus showing that the mean GAIS and patient-reported satisfaction scores were significantly higher in the Mint Lift + liposuction group when compared with the Mint Lift group (1.85 and 3.06 points versus 2.54 and 2.36 points; $P < 0.05$). Thus, these authors concluded that there were significant improvements in treatment effects of the Mint Lift when combined with liposuction.[30]

There are several literatures advocating the effects of barbed threadlift; these effects are classified as mechanical and biochemical ones. The former arises from the helical and bidirectional arrangement of barbs, which is followed by generation of the tensile force, applied to both sides, allowing the barbs to act as a hook without a wire slip.[42,43] The latter leads to neocollagenesis; Jang et al[44] used a rat experimental model and thereby inserted cog threads in the skin. These authors observed that myofibroblasts were a key player in the contracture of

the fibrous tissue at 4 weeks following the insertion of thread. In addition, histologic examinations showed the formation of a homogeneous fibrous capsule around the thread, leading to the preservation of the traction and compactness of tissues. Moreover, there was an increase in the thickness of the dermal papillae on histopathology, which is suggestive of the interstitial growth of collagen components.[25]

Facial rejuvenation using the Mint Lift Fine can be summarized as follows: First, considering not only that there are no major vessels or nerves in the superficial fat compartment but also that the superficial fat compartment and the SMAS can be displaced as a single structure because they are attached to each other, we placed the Mint Lift Fine in the superficial fat compartment rather than the SMAS.[45] No placement of the threadlift in the superficial layer of the skin is allowed, however, because marks can be left in patients with thinner skin.[25,46] Second, we fixed the Mint Lift Fine in the zygomatic ligament and retinacula cutis. Both structures are more flexible when compared with the deep temporal fascia or periosteum, which may reduce postoperative discomfort or pain.[47] Third, we repositioned ptotic subcutaneous fat to the original location without dissecting facial layers. Thus, we lifted multiple layers of the face without skin traction.

CONCLUSIONS

With emergence of minimally invasive facial rejuvenation techniques, patients have been benefited from their use; the corresponding advantages include shorter operation time, office-based treatment procedures, and fewer perioperative complications. Of minimally invasive facial rejuvenation techniques, thread lifting is performed as a nonsurgical modality.[7,48] Absorbable or nonabsorbable threadlifts have been used, but nonabsorbable ones are disadvantageous in that they are permanently left in the tissue and then palpated on the skin. Thus, nonabsorbable threadlifts may cause complications such as skin dimpling, suture extrusion, or other permanent complications. Facial rejuvenation techniques using absorbable threadlifts have, therefore, become desirable.[25,49,50]

In conclusion, we describe treatment outcomes of facial rejuvenation using a novel absorbable PDO monofilament threadlift in patients with NLFs, nasojugal groove, marionette lines, or sagging jowl. But our results cannot be generalized because we retrospectively evaluated a small series of patients for short periods of time. In addition, sustainability of treatment effects over time deserves more attention. Further large-scale, prospective, multicenter studies with long periods of follow-up are, therefore, warranted to establish our results.

Hyoung-Jin Moon, MD
BeUp Aesthetic Plastic Surgery Clinic
3Fl Shinwoong Tower
216 Teheran-ro, Gangnam-gu
Seoul 06221, South Korea
E-mail: beautymoon@hotmail.co.kr

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