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AESTHETIC AND REGENERATIVE MEDICINE CAN IMPROVE RESULTS AND SATISFACTION DURING AND AFTER WEIGHT LOST IN OBESE PATIENTS: PRELIMINARY CLINICAL EVALUATION USING SUBDERMAL INDUCED HEAT (S.I.H.) TECHNOLOGY

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Summary

After massive weight loss, patients typically presented with skin redundancy, which causes enormous esthetic, physical, medical and psychological problems. Aesthetic medicine can implement various treatments in these subjects that help to alleviate the psychological discomfort.

A retrospective study was carried out between December 2018 and December 2023, including experience in 30 patients following bariatric treatment or undergoing a dietary restriction regime, during or after losing weight.

For the treatment the authors used subdermal induced heat (S.I.H.) technology, a latest-generation device with continuous fractional and sequential emission, which features important technological innovations.

This prospective pilot data confirmed that subcutaneous radiofrequency is a safe and effective in improvement in skin laxity. Patients' satisfaction was high. This treatment cannot substitute surgical procedure but manages to accompany patients in losing weight. Further confirmation investigation should be performed.

Key words: subdermal radiofrequency, weight loss, obese patients, skin laxity, aesthetic treatment

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INTRODUCTION

Once considered a problem only in high-income countries, obesity is now a widespread public health issue, increasing in the underdeveloped and developing countries, particularly in urban settings [1].

With the rising rate of obesity, bariatric procedures have become increasingly popular.

After massive weight loss, patients typically presented with skin redundancy, which causes enormous esthetic, physical, medical and psychological

problems. Since the beginning of post-bariatric surgery (mostly at the start of the XXI century) an increasing number of authors have published different surgical techniques, technical improvements, pearls and anatomic details on contouring surgery after massive weight loss, contributing to the knowledge and development of this area of plastic surgery [2-9].

The majority of obese or formerly obese patients who achieve the goal of slimming treatments, however, have aesthetic needs that are not met by simple slimming or even by the removal of residual pendent skin, and in addition to these procedures that could be defined as corrective plastic surgery, they also require aesthetic plastic surgery, such as face or neck lifts, correction of the glutei and other interventions.

Aesthetic medicine can also implement various treatments in these subjects that undoubtedly help to alleviate the psychological discomfort that many complain of, and that in some cases leads them to leave the curative course and return to obesity.

The aim of this work is to present our experience in patients following bariatric treatment or undergoing a dietary restriction regime, during or after losing weight, using a device that acts in the subcutaneous area by emitting radiofrequency (S.I.H. technology).

MATERIALS AND METHODS

We performed a retrospective study on 30 patients treated with S.I.H. technology in the last five years for skin laxity following or concomitant with stabilised or progressing weight loss.

Patients who had undergone surgery or on caloric restriction for no more than one year and who had lost at least 10% of body weight were included in the study.

Patients unable to maintain a weight reduction were excluded.

We evaluated the results obtained six months after the first treatment. During the follow-up consultations, we evaluated the overall course of treatment by taking photos and a patient evaluation is also required to give an aesthetic result score determined as follows: +2 remarkable improvement, +1 slight improvement, 0 no appreciable change with stable weight, -1 no appreciable change with stable weight, -2 worsening (Tab. I).

Photos were taken for reference.

To carry out the treatment, we used a latest-generation device with continuous fractional and sequential emission, which features important technological innovations: in particular, thin blunt-tipped shielded needle cannulae, which allow treatment of absolute precision; a thermo chamber that allows monitoring of the area under treatment; a dual system of continuous temperature measurement both through the cannulae and through variations in skin thermometry (Fig. 1).

We used this method in different anatomical areas with generally marked skin laxity: face, neck, abdomen, arm, thigh and knee.

We used various treatment programs, all divided into two sessions (sessions) repeated after 45 to 60 days apart.

The times and energy used varied according to the characteristics of the patient and the site being treated, but they were standardised to achieve predetermined temperatures. The effects obtained with the treatment are related to the temperatures set and reached by the tissue at the unscreened end portion of the cannulae (10 mm). Temperatures between 44° and 50° degrees stimulate the tissue, inducing collagen production and also improving circulation (angiogenesis); temperatures between 51° and 60° degrees treat deeper planes,

Table I. Treatment and self-satisfaction assessment score.

Patient	Treatments carried out	Improvement score self assessed
1	FACE	1
2	FACE	2
3	FACE	2
4	FACE	1
5	FACE	-1
6	ABDOMEN	1
7	ABDOMEN	0
8	NECK	1
9	ARM	-1
10	KNEE	1
11	NECK	2
12	FACE-NECK	2
13	FACE-NECK	2
14	FACE-NECK	2
15	FACE-NECK	1
16	FACE-ARM	2
17	FACE-ARM	1
18	FACE-ABDOMEN	2
19	FACE-ABDOMEN	1
20	ABDOMEN -THIGH	-1
21	ABDOMEN-THIGH	2
22	ABDOMEN-NECK	1
23	FACE - NECK -ARM	2
24	FACE - NECK - ARM	1
25	FACE - NECK - ARM	2
26	FACE - ABDOMEN - KNEE	2
27	ABDOMEN - THIGH - KNEE	2
28	FACE - NECK - ABDOMEN -ARM	2
29	FACE -ARM-THIGH-KNEE	1
30	ABDOMEN -ARM-THIGH-KNEE	2

scars and obtain lysis of adhesions; temperatures up to 70° degrees result in a more evident tissue lysis at the adipocyte level.
We practised tumescent anaesthesia with Klein's solution (Tab. II) to be treated only when temperatures above 50° degrees were expected while in other cases we only applied local anesthesia (lidocaine) at the cannula entry hole.
We make an access hole with an 18 or 16-gauge needle through which we introduce the cannulae with a variable length that goes from a minimum of 5 cm to a maximum of 20 cm. The duration of the treatment is usually fixed in slots of 180 seconds each and the radiofrequency emission occurs during the slow retraction of the cannula, previously introduced into tunnels created in a programmed manner.

RESULTS

We analysed the treatments carried out and the results obtained in 30 patients, nine had previously been treated with various bariatric techniques (3 gastric balloons, 1 gastric band, 3 gastroresections, 2 bypasses), while the others practised or had completed a course of dietary restrictions assisted in several cases also pharmacologically.
11 patients underwent a treatment (2 sessions) of S.I.H. at a single anatomical site, 11 patients underwent the therapy at 2 different sites, 5 patients at 3 sites, and 3 patients at 4 sites, for a total of 60 cycles of therapy at 6 different anatomical sites (Tab. I).
In particular, 19 treatments (38 sessions) were carried out on the face, 11 on the neck (22 sessions) and 11 on the abdomen (22 sessions) (Fig. 2), 9 on the arm (18 sessions), 5 treatments on the knee (10 sessions), 5 on the thigh (10 sessions) (Figs. 3-4), for a total of 120 sessions in the different areas, obviously all bilateral.

Figure 1. Tecnhonology touch screen display and cannula.

Table II. Tumescent solution.

Lidocaine	1000 mg/ml
Epinephrine	1 mg/L
Bicarbonate	10 mEq/L
Triamcinolone	10 mg/L
Soluzione Salina	

Multiple therapies were carried out in the same session only in 20% of the patients, while in most cases the sessions were spaced out. Analysing them, the most frequent associations were those of the face: in 9 patients with the neck, in 6 with the arm, in 4 with the abdomen, less frequently with the knee, involving 2 patients.
The abdomen was treated four times with the face or the knee, twice with the thigh or the arm and twice in association with the neck.
The arm was treated six times with the face, in five patients with the neck, in two cases with the knee or the abdomen.
The treatment of the knee was associated four times with the abdomen, three times with the thigh, twice

Figure 2. Abdomen Treatment during weight loss: **A**) pre-; **B**) post 6 months.

Figure 3. Thigh Treatment during weight loss: **A**) pre-; **B**) post 6 months.

Figure 4. Abdomen Treatment during weight loss: **A**) pre-; **B**) post 3 months.

with the arm or the face and once with the neck. The neck was associated nine times with the treatment of the face and five times with that of the arm, once with the abdomen and the knee. The other associations between different anatomical sites were practised less frequently. The score given to the results obtained, together with the patients, was in three cases -1 and in one case 0. For the other 26 patients we rated a slight improvement +1 in 11 subjects, +2 in 15 subjects. Despite these positive evaluations, six subjects after one treatment and two after two treatments stated that they were not interested in further courses of therapy because they wanted a more noticeable result, while five other patients were satisfied with the result and therefore not motivated to continue with further sessions. All the patients who underwent combined treatments, except two, gave positive consideration to the possibility of therapy at another site that was proposed and at the end of each treatment cycle.

DISCUSSION

Literature on the use of aesthetic medicine techniques in bariatric patients is sporadic, unlike for example in cancer patients, who are now rightfully among those who benefit greatly from aesthetic medicine.
Various methods of aesthetic medicine are able to treat skin laxity and to reduce aesthetic defects caused by excessive slimming. These include: focused ultrasounds [10], "calcic"hydroxyapatite injections [11], lasers [12], radiofrequency [13].
The use of radiofrequency (RF) in wrinkle reduction has been approved since 2002 by the American FDA, and in the following years it has found an increasingly wide range of applications with the use of mono or bipolar radiofrequency used transcutaneously. In the following decade the first attempts were made to use RF directly under the skin to heat tissue at a subcutaneous or deep level, without significantly increasing skin temperature.
The authors have already described the use of these device in a prospective pilot study on safety and efficacy in facial chrono-aging treatment [14] and with different treatment protocols [15].
The authors have, therefore, extended the application to the treatment of malar bags [16].
RF treatments allow immediate and delayed results. The immediate result consists of a tissue contraction due to the direct effect of the heat, which translates into soft tissues with a tone increase and a lifting effect. After a few months, the stimulation of the fibroblasts allows an increase in their number and in their collagen, elastin, and hyaluronic acid synthesis activity and an increase in skin firmness.
The treatment temperature ranged between 45-50°C which was sufficient to determine the contraction of the collagen without inducing necrosis and to determine tissue regeneration in the medium term.
This preliminary study indicates RF a valid tool with high levels patient satisfaction during or after losing weight.

CONCLUSIONS

These patients are excellent candidates for aesthetic treatment as they are highly motivated and because they generally show significant defects.
Aesthetic treatment contributes to accompanying these subjects in losing weight, reducing abandonment of the diet, contributing to the maintaining and acceptance of therapies directly aimed at obesity and also increasing the percentage of perceived aesthetic improvement.
Surely this study has limitations, given the small number of patients enrolled and the difficulty of having an objective measure of the aesthetic improvements.
Multicenter studies and more detailed measurements of these results would be useful.
RF cannot be considered a substitute for a surgical treatment but, surely, the use of aesthetic medicine should be considered in obese individuals at the beginning, during and at the end of their course of treatment and that the aesthetic doctor can rightly find a place in the teams who deal with this pathology.

Conflict of interest statement
The authors declare no conflict of interest.

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Author contributions
NS: A, S
BF: A, S, W
GM: D
MGO: DT

Abbreviations
A: conceived and designed the analysis
D: collected the data
DT: contributed data or analysis tool
S: performed the analysis
W: wrote the paper
O: other contribution (specify contribution in more detail)

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