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Original article

The combination of laser lipolysis, skin tightening and magnetic stimulation in body contouring: Our experience of this novel combination therapy

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Abstract. *Background:* There has been an increasing desire and interest for non-invasive body contouring techniques within the field of aesthetic medicine. *Aims:* We present our experience and review of the safety, efficacy and tolerability of combining laser lipolysis, skin tightening and High-Intensity TESLA magnetic stimulation (HITS™). *Methods:* 9 patients underwent between 2-6 sessions of a combination of laser lipolysis, skin tightening and HITS™ muscle stimulation for unwanted abdominal fat. Objective outcome was assessed by the change in compound measurements taken before and after each treatment session. Subjective outcomes include the patient's overall impression, a photographic assessment and a visual analogue scale of patient acceptability. *Results:* All patients demonstrated a reduction in compound girth measurement after a treatment session and this reduction was sustained between treatment sessions allowing a gradual and continuous reduction in compound girth over a 6-month period. Patients with lower initial body fat benefited from greater muscle tone and definition. All patients felt their appearance was "much improved" or "very much improved" and all found the treatment acceptable and would recommend to a friend. *Conclusions:* The combination of TightSculpting™ and the StarFormer® HITS™ seems to be an effective and non-invasive method for abdominal body shaping, which is safe and well tolerated by patients with high levels of patient satisfaction.

Key words: bodysculpting, aesthetics, lipolysis, muscle stimulation

Introduction

There has been an increasing interest in non-invasive body contouring techniques within the field of aesthetic medicine[1]. Two prominent technologies in this field are laser fat reduction and magnetic muscle stimulation. Both offer innovative approaches to fat reduction and body contouring without the need for surgery or breaching the skin. Several papers have been published on the two techniques separately, but to our knowledge, this is the first study to assess the combination of laser lipolysis, skin tightening and magnetic muscle stimulation. We briefly explore the mechanism of action, clinical applications of these technologies and outline the results of our study evaluating the efficacy of combination therapy for non-surgical body contouring.

Laser TightSculpting:

The TightSculpting™ treatment (Fotona, Ljubljana Slovenia), is a non-invasive body contouring and skin tightening therapy. It is effective in reducing localized fat deposits in areas such as the abdomen, flanks, thighs, and arms. The treatment is a dual-purpose procedure for body contouring that simultaneously targets adipose fat reduction and improves skin laxity through collagen rejuvenation. TightSculpting™ is

a dual-wavelength laser treatment that combines the benefits of two laser modalities: Nd Yag and Er Yag. The procedure involves a two-step approach that enables sequential deep tissue heating followed by superficial skin tightening[2-6].

1. Nd Yag (1064nm): Fat reduction: This wavelength penetrates deeply into the skin, targeting subcutaneous fat. The Nd Yag laser induces thermal effects that lead to the disruption of fat cells (adipocytes). Adipocyte pyroptosis occurs at tissue temperatures of 40–43˚C. The controlled heating also stimulates deeper collagen remodelling and neocollagenesis, enhancing skin tightening.
2. Erbium Yag (2940nm): Skin tightening: This wavelength is absorbed more superficially and is used for skin resurfacing and tightening. The Erbium (Er) Yag is delivered in pulses (patented SMOOTH mode) which is non-ablative. The Er Yag laser targets the epidermal and dermal layers, promoting collagen contraction and remodelling.

Clinical studies and patient reports suggest that Fotona TightSculpting provides significant improvements in body contour and skin texture. In vivo CT imaging before and after treatment has shown reductions in subcutaneous fat without increases in visceral fat[5]. Most patients experience visible fat reduction and tighter skin after a series of treatments. The procedure is generally well-tolerated with minimal downtime, making it a popular choice for individuals seeking non-surgical body contouring options.

Magnetic muscle stimulation

The StarFormer (Fotona, Ljubljana Slovenia), employs High-Intensity TESLA magnetic stimulation (HITS^{TM}) to induce supramaximal muscle contractions. This non-invasive technology is designed to enhance muscle tone and strength[7-9]. HITS™ generates strong electromagnetic fields that stimulate muscle contractions at a rate and intensity higher than what can be achieved through voluntary exercise. These contractions trigger muscle hypertrophy and improve muscle strength, tone and definition. HITS^{TM} therapy is used primarily for enhancing muscle tone in various body areas, including the abdomen, buttocks, thighs, and arms. It is particularly beneficial for patients looking to achieve a more toned and sculpted physique without invasive procedures[10-13].

As both the Fotona TightSculpting and StarFormer aim to reduce fat and improve body contour through different mechanisms this study aimed to evaluate the effects of combination therapy. TightSculpting focuses on thermal fat disruption and skin tightening, making it suitable for patients with skin laxity and localized fat deposits. In contrast, StarFormer emphasizes muscle building, targeting patients who seek enhanced muscle tone and overall body sculpting.

Methods

We took 9 consecutive patients attending our clinic seeking non-invasive body contouring treatment and offered them a combination of laser fat reduction and skin tightening using the Fotona SP Dynamis TightSculpting protocol as well as High Intensity TESLA magnetic stimulation therapy using the Fotona StarFormer TightWave protocol. The protocol consisted of the following steps: STEP 1: fat reduction: Nd Yag applied using the 'L Runner' used to cause apoptosis of fat cells. In addition an air cooler device is used at levels 1–2, depending on Fitzpatrick skin type, to ensure surface skin temperature remains between 36-38 degrees Celcius whilst deeper tissue temperatures are achieved for apoptosis of fat. The cooler setting was adjusted to reach a surface temperature of up to 39˚C within 75–90 seconds, following Fotona's latest protocol. Treatment involves 3 passes cyclically over 4 areas of the abdomen. STEP 2.1: Collagen stimulation and skin tightening Erbium Yag is applied using the 'T Runner' to achieve collagen stimuation. The 'T runner' applied at: 11.2 J/cm2 , 375 ms, STP: 118% and used cyclically over 4 areas and rotated for 3 passes. STEP 2.2: Collagen stimulation and skin tightening: Erbium Yag is applied using the 'T Runner' to achieve further collagen stimuation. Applied at: 9 J/cm2, 625ms, STP: 119% cyclically over 4 areas and rotated for 3 passes. STEP 3: Muscle stimulation and hypertrophy: The

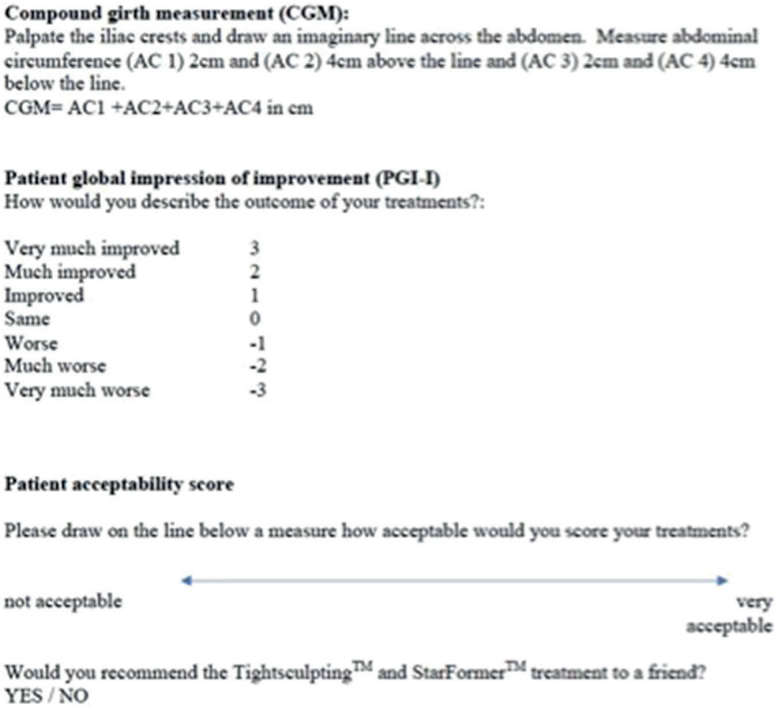
Starformer HITS therapy utilised by applying one or two paddles over the recti abdominis and obliques (depending on the size of the patient: usually one paddle for women and two paddles for men). The treatment is applied for 30 minutes at highest intensity level tolerated by the patient, with two sessions per week between Tightsculpting treatments (1 month apart). Fat reduction and skin tightening sessions were conducted every 4 weeks with HITS therapy applied at each session and once or twice weekly in between.

We performed compound girth measurements at baseline and before and after every treatment. Measurements were taken of abdominal circumference at 4 points and added to give a compound girth measurement (CGM). The four points were measured 2 and 4 centimetres above and below a line drawn across the iliac crests. Patients were offered a course of combination treatments customised to their particular goals and "trouble spots".

We included all patients seeking body contouring but excluded any that had metal implants / or pacemaker in their abdomen or pelvis. Both male and female patients were included. The primary outcome measure was the change in the compound girth measurement (CGM) from baseline the treatment completion. Secondary outcome measures were 1) change in CGM between treatment sessions, 2) patient acceptability scores as scored on a Likert-type visual analogue scale, 3) Patient Global Impression of improvement (PGI-I: Figure 1) using a validated Likert scale and 4) open ended questionnaire and patient interviews on their experience. Statistical analysis: the change in CGM were evaluated using paired t-test.

Results

All 9 patients demonstrated a significant reduction in CGM over a variety of treatment sessions p=0.001, as outlined in figure 2. The number of treatment sessions varied from just two sessions in two patients, with the majority receiving the recommended


Compound girth measurement (CGM):
Palpate the iliac crests and draw an imaginary line across the abdomen. Measure abdominal circumference (AC 1) 2cm and (AC 2) 4cm above the line and (AC 3) 2cm and (AC 4) 4cm below the line.
CGM= AC1 +AC2+AC3+AC4 in cm

Patient global impression of improvement (PGI-I)
How would you describe the outcome of your treatments?:

Very much improved	3
Much improved	2
Improved	1
Same	0
Worse	-1
Much worse	-2
Very much worse	-3

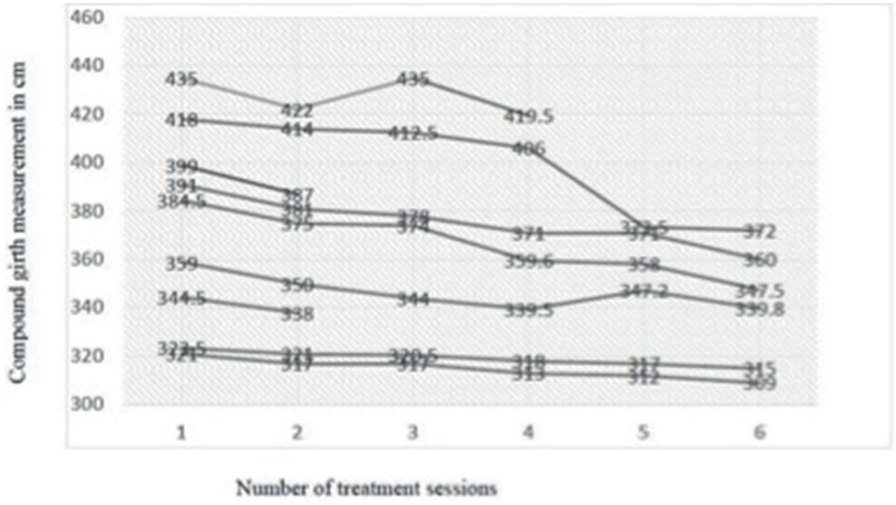
Patient acceptability score

Please draw on the line below a measure how acceptable would you score your treatments?

not acceptable very acceptable

Would you recommend the Tightsculpting™ and StarFormer™ treatment to a friend?
YES / NO

Figure 1. Compound Girth measurement, PGI-I scale and Visual analogue scale for abdominal measurements, patient impression of improvement and patient acceptability scores.



	P1	P2	P3	P4	P5	P6	P7	P8	P9
GCM (cm) T1	435	418	399	391	384	359	344	323	321
GCM (cm) T2	422	414	387	381	375	350	338	321	317
GCM (cm) T3	435	412		378	374	344		320	317
GCM (cm) T4	419	406		371	359	339		318	313
GCM (cm) T5		373		371	358	347		317	312
GCM (cm) T6		372		360	347	339		315	309
% reduction	4	11	3	8	10	6	2	2	4

Figure 2. Results of compound girth measurements: the graph demonstrates a reduction in CGM in all patients with time. p=0.001 (paired t test).

6 sessions. Patients who opted for only 2 or 4 sessions, did so as they already achieved their target and and declined further fat reduction or contouring. All patients found the treatment acceptable. All scored between 7 and 10 on a 0–10 Likert-type visual analogue scale for treatment acceptability, and all stated they would "recommend the treatment to a friend. All patients scored their impression of improvement as "much improved" (3 of 9 patients) and "very much improved" (6 of 9 patients). No patient scored less than "much improved" on PGI-I (Patient Global Impression of Improvement) (Figure 2).

The reduction in CGM was more pronounced in individuals with greater adipose tissue, whereas muscle definition was more pronounced in those with less fat. On open-ended questionnaires patients commented on noticing a reduction in the size of clothes they wore after completion of therapy, the loss of "stubborn' fat that routine exercise could not shift and a greater sense in core strength. Examples of before and after treatment can be seen in Figure 3.

Discussion

Fotona TightSculpting and StarFormer TightWave represent significant advancements in non-invasive body contouring technologies. Each offers unique benefits tailored to different patient needs and goals. TightSculpting is ideal for those seeking fat reduction and skin tightening, while StarFormer TightWave therapy is well-suited to patients looking to enhance muscle tone and definition. Both treatments provide effective, safe, and non-surgical alternatives

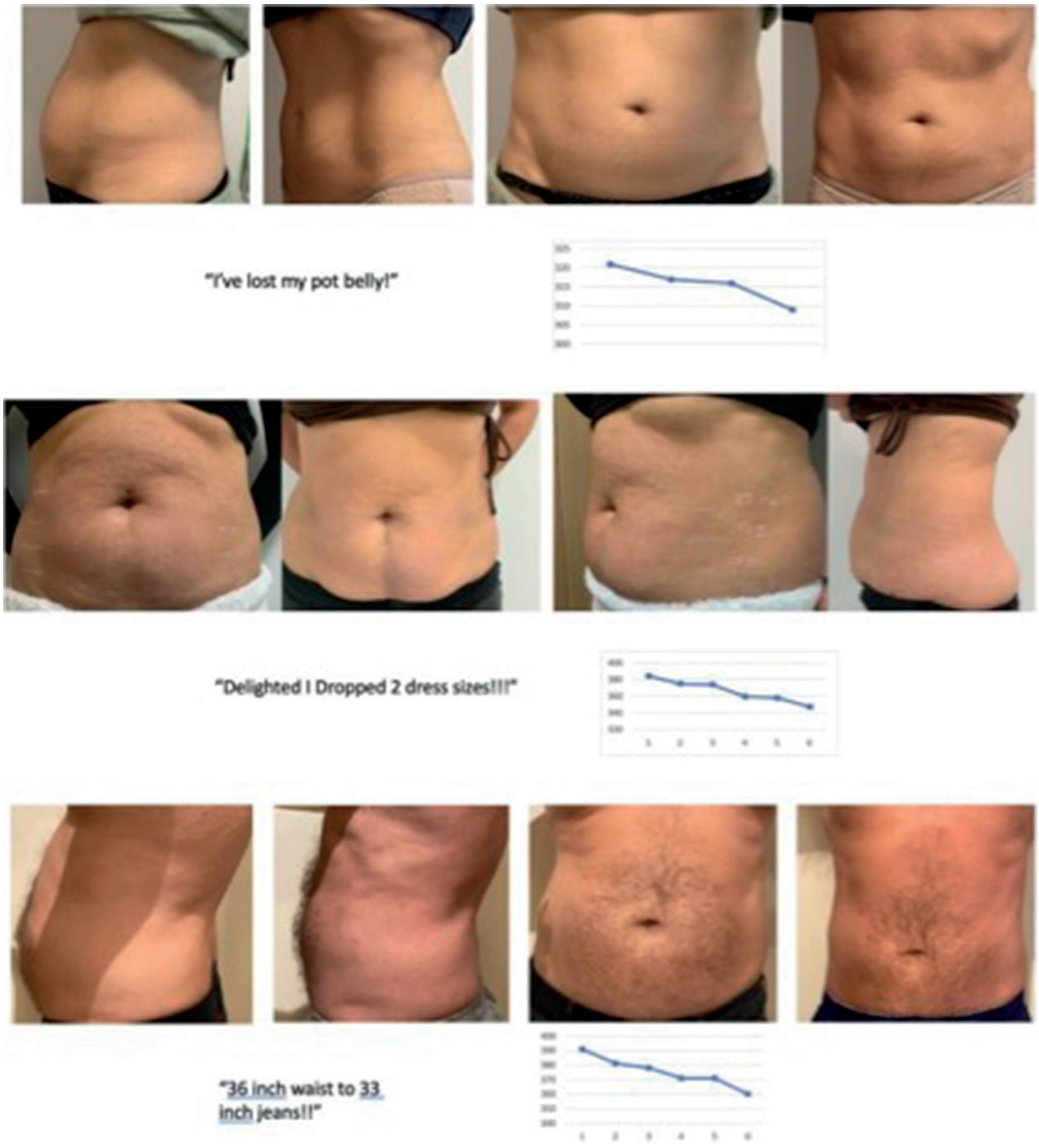


Figure 3. Before and after images of 3 patients demonstrating body contouring results and open-ended questionnaire comments.

for body sculpting, catering to the growing demand for minimally invasive aesthetic procedures. As technology continues to evolve, these treatments will likely become even more effective and accessible, offering patients more options for achieving their desired body contours. Our study demonstrates that combining laser fat reduction and skin tightening with HITS therapy is an effective, painless and acceptable treatment

option for patients seeking a non-invasive treatment option for fat reduction and body contouring. The results of both treatments are typically visible after a few sessions, with incremental improvements over time. The longevity of the results depends on factors such as the patient's lifestyle, diet, and exercise habits[14]. There are several challenges in assessing the morphological changes in the abdomen. High resolution magnetic resolution and computer tomography have been used in the past and demonstrated that laser lipolysis results in the reduction of superficial fat and total body fat[5]. Unfortunately, both MR and CT scanning are expensive and not amenable to routine clinical use. The use of compound girth measurements based on compound bony landmarks has previously been validated as an easy alternative to imaging that can be performed in the outpatient setting and reduces inaccuracies in measurements that can arise when using soft tissue reference points (eg. The umbilicus or moles etc) for taking measurements as these may change with weight loss / weight gain and reduction in adipose tissue[15]. A similar method using bony landmarks was employed by Valdivia when assessing the same HITS^{TM} technology. They reported the results of 10 patients undergoing 8 sessions of HITS^{TM} therapy (2-3 sessions per week)[16]. The results showed both a visual improvement in the contours and tone of the abdomen (as determined by blinded assessors of photographs) and a reduction in waist measurements. The results were also associated with an improvement in patient satisfaction in outcomes. Similar results have separately been presented using HITS^{TM} Tightwave therapy showing both improved visual appearance with hypertrophy of the rectus abdominis muscle as well as increased muscle strength and reduced circumference[17].

To our knowledge, this is the first study to assess the combination of both laser lipolysis using the Fotona Tightsculpting protocol and the Starformer tightwave HITS^{TM} treatment. Our findings suggest that patients with more pronounced body fat are likely to see more significant results than those with less body fat. Our analyses suggest most patients noted between a 5-10% reduction in compound girth measurement. The combination of muscle stimulation allows the clinician to offer bespoke treatments according to the patient's wishes, target areas, and treatment goals. Those with greater abdominal adipose tissue showed greater reduction in compound girth measurement which was sustained between treatments (and not regained) over the course of 3-4 months of therapy. This is reassuring as it demonstrates the degree of lipolysis is not transient and does not get redistributed back onto the waist over time. Similar studies have demonstrated that overall weight remains stable and there is no increase in visceral fat[5]. The effects of magnetic stimulation on body definition are well recognised. Our study has demonstrated HITS^{TM} achieves greater muscle definition and tone consistent with similar studies of magnetic stimulation on body contouring[18,19]. One patient also reported greater core strength and less problems with injury whilst training at the gym which is consistent with other reports of musculoskeletal rehabilitation[20].

Conclusion

HITS™ magnetic stimulation combined with laser lipolysis and skin tightening seems to be an effective and safe method for muscle toning and body shaping, resulting with visible improvement and very high patient satisfaction rates.

Conflict of Interest: The Starformer HITS™ magnetic stimulation device was donated by Fotona for the study.

Ethical Statement: All procedures performed in studies involving human participants were in accordance with the ethical standards of the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Patient Consent: All patients signed the informed consent form after understanding the nature of the trial.

Data Availability Statement: The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Images Consent: All patients have agreed for the publication of before and after images.

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