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High-Intensity Focused Ultrasound Treatment after Cryolipolysis may be Used to Reduce Pain : Two case report

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Abstract

In recent years, interest in body sculpting has increased and various technologies have been used and developed. In the present study, we assessed the efficacy and safety of combination treatment using high-intensity focused ultrasound (HIFU) and cryolipolysis. The findings show that not only HIFU but also combination treatments are safe and well-tolerated options for the treatment of central abdominal subcutaneous adipose tissue (SAT). Interestingly, the pain associated with HIFU when it was performed after cryolipolysis was significantly reduced.

KEYWORDS

body sculpting, cryolipolysis, high-intensity focused ultrasound

1 | INTRODUCTION

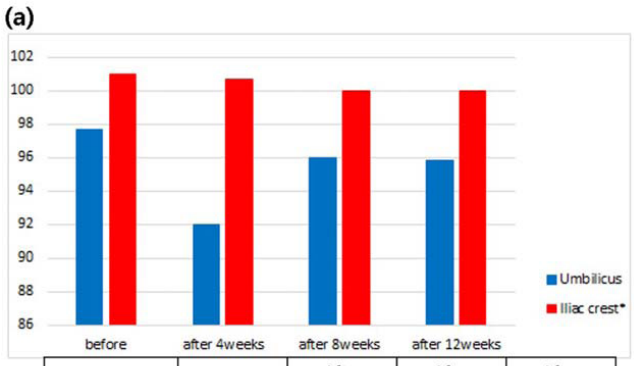
Body sculpting has become more popular and various technologies have been used and developed. These technologies include lowlevel laser therapy (LLLT), cryolipolysis, radio frequency (RF) and high-intensity focused ultrasound (HIFU). Each technique has varying results in terms of efficacy and patient satisfaction (Kennedy, Verne, Griffith, Falto-Aizpurua, & Nouri, 2015). Of these, patient satisfaction is the lowest for HIFU, which may be due to pain during the procedure (Kennedy et al., 2015). Cryolipolysis has the effect of lowering skin temperature and the feeling of temporary numbness (Nelson, asserman, & Avram, 2009). It will help to ease the pain sensations. We thought that combination treatments with two noninvasive body contouring devices would be expected to complement each other and have a synergistic effect. In the present case study, we assessed the efficacy and safety of combination treatments with HIFU and cryolipolysis.

2 | CASE REPORT

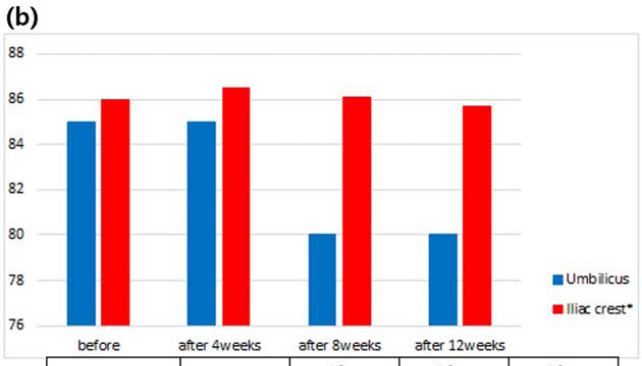
2.1 | Case 1

A 46-year-old female wanted to correct the contour of her flank. At baseline, she weighed 74.9 kg with a BMI of 27.25. The patient opted to have the left side of her abdomen treated with only an HIFU device (SCIZER, CLASSYS INC., Seoul, Korea). The contralateral side was treated first with cryolipolysis (CLATUU, CLASSYS INC., Seoul, Korea) and then HIFU (SCIZER). On her left flank, the HIFU device (SCIZER) parameters were set at a total energy dose of 120 J/cm2 at a focal depth of 1.3 cm. On her right flank, cryolipolysis treatment was

delivered first at commercial parameters (maintenance of -9°C for 40 minutes) and then the HIFU device was applied. The treatment applicators were positioned at the focal area of adiposity on her periumbilical abdomen. Waist circumference was measured at the level of the umbilicus and the superior border of the iliac crest. The results showed a waist circumference reduction of 1.9 cm from baseline at 12-week follow-up (Figure 1a). Immediately after treatment, no pain was reported on the combination treatment side, but for HIFU only treatment, the visual analogue score (VAS) was 4 (Figure 2a). Adverse events, such as erythema and bruising, were mild and spontaneously resolved within 1–2 days.



Level	Before	After 4weeks	After 8weeks	After 12weeks
Umbilicus	97.7	92.0	96.0	95.8
Iliac crest	101.0	100.7	100.0	100.0

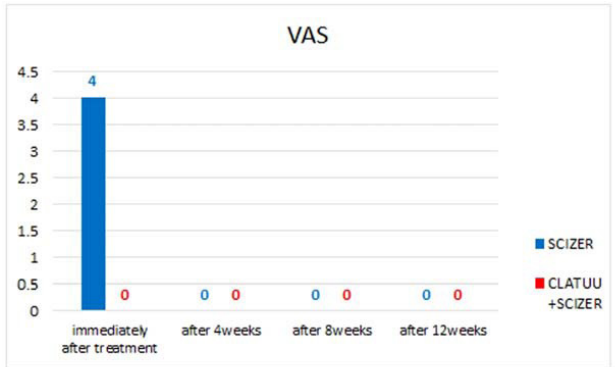


Level	Before	After 4weeks	After 8weeks	After 12weeks
Umbilicus	85.0	85.0	80.0	80.0
Iliac crest	86.0	86.5	86.1	85.7

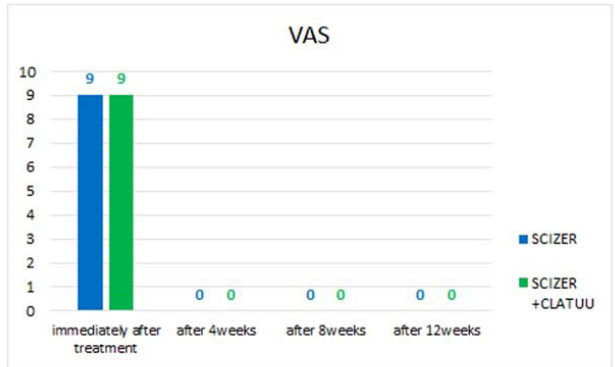
FIGURE 1 Measurement of waist circumference in (a) case 1 and (b) case 2

2.2 | Case 2

A 45-year-old female complained of subcutaneous fat in her flanks and wanted to remove the excessive fat. At baseline, she weighed 56.9 kg with a BMI of 20.5. The left side of the patient's abdomen was treated with only HIFU (SCIZER) using three passes to deliver a total energy dose of 120 J/cm2 at a focal depth of 1.3 cm. Her right side was treated with a single cycle of cryolipolysis using commercial parameters (maintenance of -9°C for 40 minutes) after the same HIFU procedure used on the left side. To evaluate treatment efficacy, waist circumference and subcutaneous fat thickness were measured. Waist circumference was reduced by 5 cm at the umbilical level (Figure 1b). As measured by fat CT, fat thickness decreased by 1.05 cm on both sides, and the reduction of subcutaneous adipose tissue (SAT) area was 7.3% (Figure 3). Although both sides of the abdomen received different treatment types, VAS scores were 9 on both sides (Figure 2b). The patient had no weight change. Other side effects, such as erythema and swelling, were resolved without sequelae.



Side	Treatment	immediately after treatment	after 4weeks	after 8weeks	after 12weeks
Left	SCIZER	4	0	0	0
Right	CLATUU +SCIZER	0	0	0	0



Side	Treatment	immediately after treatment	after 4weeks	after 8weeks	after 12weeks
Left	SCIZER	9	0	0	0
Right	SCIZER +CLATUU	9	0	0	0

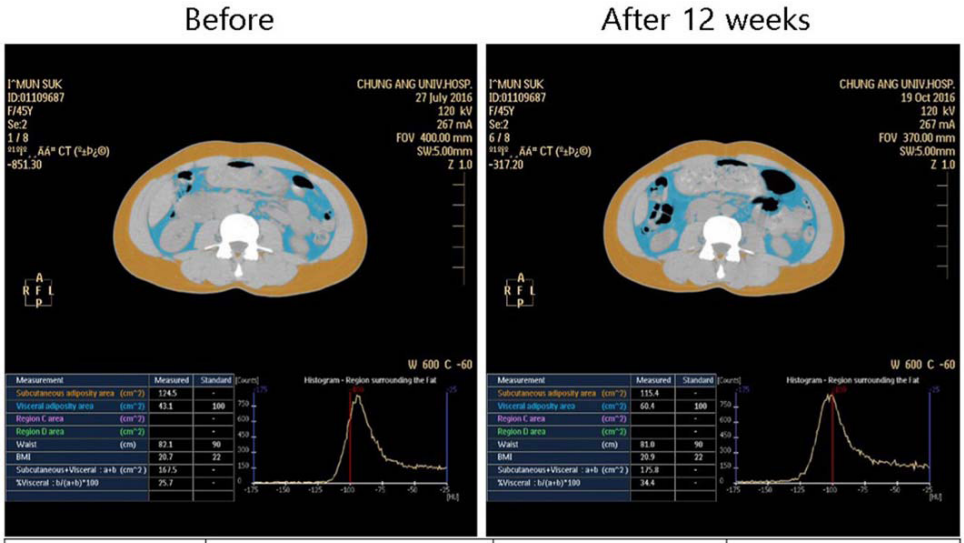
FIGURE 2 VAS scores for pain in (a) case 1 and (b) case 2

3 | DISCUSSION

The mechanism of HIFU in body contouring suggests that adipose tissue is destroyed by thermal and mechanical effects producing adipocyte membrane disruption and coagulative necrosis (Haar & Coussios, 2007). Cryolipolysis technique showed cutaneous cooling-induced adipocyte apoptosis, triggering a selective delayed lobular panniculitis following reduction in subcutaneous fat in a pig model (Manstein et al., 2008). According to a number of studies for the present procedure, waist circumference and fat thickness by caliper were significantly reduced in treated areas. A study by Fatemi and Kane illustrated that HIFU treatment reduced waist circumference by a mean of 4.7 cm (Fatemi & Kane, 2010). Sasaki et al. also demonstrated a mean reduction in caliper measurements of 1 cm after a single cryolipolysis session (Sasaki, Abelev, & Tevez-Ortiz, 2014). In the present study, as both sides of the abdomen were treated differently, waist circumference, fat thickness and SAT area of fat CT were reduced, but there was no difference in fat thickness between treatment methods.

One study described synergistic effects for combined treatment with cryolipolysis and extracorporeal shock wave in 50 subjects (Ferraro et al., 2012). Mean reduction in abdominal circumference and thickness of 3.02 and 4.45 cm was achieved, respectively. In addition, extracorporeal shock followed by cryolipolysis diminished the pain associated with the procedure. The present study was the first attempt at combining cryolipolysis and HIFU.

To evaluate subcutaneous fat reduction efficacy, ultrasound, fat CT, and waist circumference were used in the present study. The results for fat thickness using ultrasound (data are not shown) were varying. Even though ultrasonography has been utilized extensively in previous studies, measurements need to be performed by well-trained clinicians, as fat thickness is influenced by various conditions. The result of fat CT at the umbilical level showed a reduction in fat thickness and SAT. Ultrasound assessment was regarded as an inexpensive and convenient method than fat CT. However, ultrasound might be inaccurate in obese person due to the presence of a septa (Black, Vora, Hayward, & Marks, 1988). With respect to waist circumference, the two cases reported showed differences between umbilical and iliac crest levels. Waist circumference change measured in the umbilical level is better reflected than that measured in iliac crest levels.



Subcutaneous fat thickness	Left (SCIZER)	14.06	13.01
	Right (SCIZER +CLATUU)	14.06	13.01
Abdominal SAT area		124.5	115.4

FIGURE 3 Subcutaneous adipose tissue (SAT) area and fat thickness by Fat CT in case 2

One literature reported that the umbilicus level in fat CT and waist circumference may provide the most useful measures of procedure efficacy, because this area contains the largest amount of fat in the body (Borkan et al.,

1982). Therefore, we consider that the objective tool of choice would be fat CT when measuring subcutaneous fat thickness. These findings show that combination treatment with HIFU and cryolipolysis is safe and well-tolerated options for the treatment of central abdominal SAT. Especially, the interesting result is that after cryolipolysis, the pain during HIFU treatment was decreased. Also the authors believe that this combination of noninvasive body contouring could be more synergistic than each device used alone.

CONFLICTS OF INTEREST

None declared.

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