

RESEARCH LETTER

Evaluation of a novel device combining RF and HIFES technologies for the non-invasive correction of asymmetric smiles and facial rejuvenation: A case report

Dear Editor

Radiofrequency (RF) generates heat through oscillating electrical currents to remodel collagen and tighten skin,^{1,2} while high-intensity facial muscle stimulation (HIFES) enhances muscle tone by depolarizing motor neurons.^{3,4} The present study evaluates a novel device combining RF and HIFES technologies to improve skin elasticity and muscle tone, assessing its safety, efficacy, and patient satisfaction.

A 34-year-old woman with a mildly asymmetric smile, more pronounced on the left side, sought treatment. The right side of her mouth lifted less easily, resulting in a slight smirk-like appearance. Previous botulinum toxin treatments had short-lived effects and resulted in unnatural expressions. Treatment involved the EMFACE device (BTL Industries, Inc., Boston, Massachusetts, USA), following informed consent and IRB approval (Yonsei University College of Dentistry, Approval No. 2-2024-0006). This device integrates RF and HIFES technologies. Applicators were placed on her forehead and both cheeks, guided by ultrasonography (US) (Figure 1).

Comprehensive 3D facial analysis was performed using a structured light scanner (Morpheus3D; Morpheus Company, Seongnam, Korea) to

evaluate changes in facial volume and features before and after treatment. The first treatment began in April 2024, followed by five more sessions at weekly intervals, each lasting 20 min. Initial intensities for RF and HIFES were set at 60% (RF fixed at 100%, HIFES ranging from 0% to 100%). During the first three sessions, the intensities for the forehead and left cheek were gradually increased to 100% based on patient feedback, while the intensity for right cheek was increased to 80%. From the fourth session onward, all applicators were set to 100%. From the third session onwards, all applicators were set to 100%. During higher HIFES intensities, the patient experienced mild discomfort, such as involuntary facial grimacing and eye closure; however, she reported no pain or adverse effects.

Volume analysis compared 3D images from the first, third, and sixth treatment sessions (Figure 2). The mid-face right cheek volume exhibited a 0.95% increase after the first session, while that of the left cheek decreased by 0.24%. By the third session, the right cheek volume increased by 1.54% and the left by 0.91%. After increasing HIFES to 100%, the sixth session revealed a 3.74% increase on the right and a 1.75% increase on the left. In contrast, the lower face volume

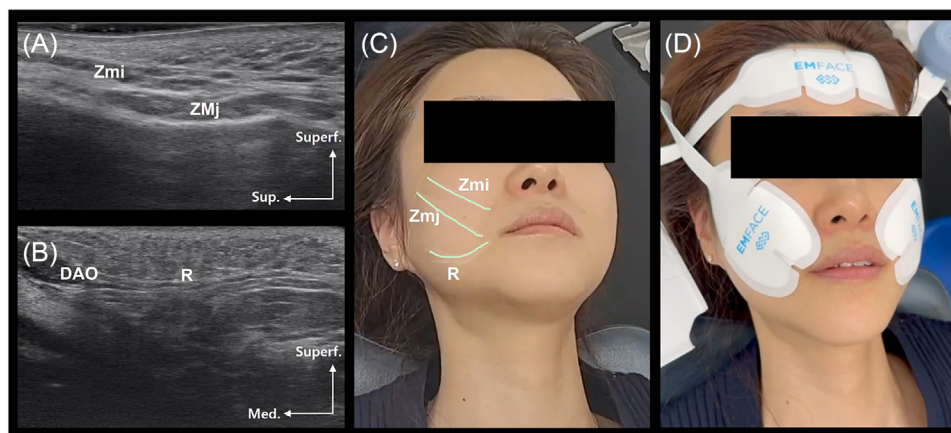


FIGURE 1 Ultrasonography was employed to confirm the muscles on both sides of the cheeks and attach the applicator to the precise location. (A) The zygomaticus major (ZMj) and zygomaticus minor (Zmi) muscles, (B) as well as the risorius (R) muscle, (C) were identified using ultrasonography and subsequently marked on the face. (D) The applicator was attached to the precise location. DAO, depressor anguli oris; Med, Medial; Sup, superior; Superf, superficial.

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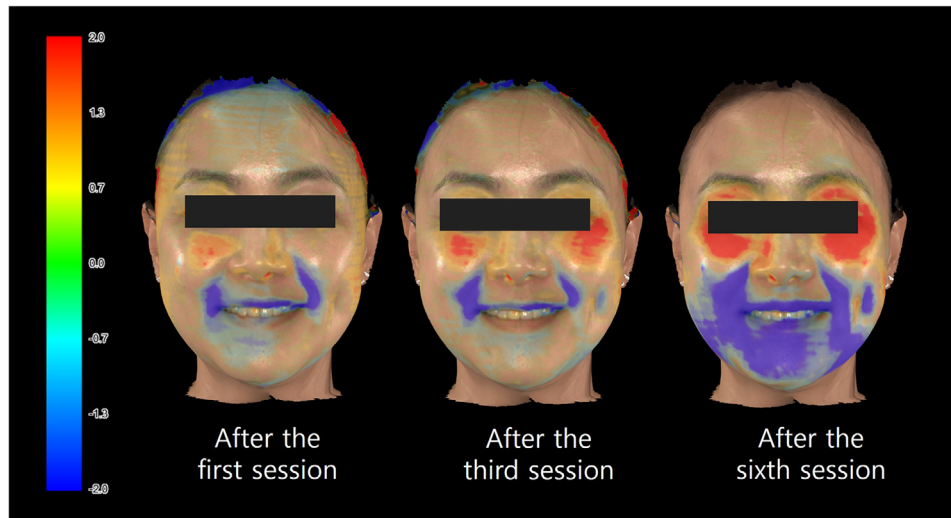


FIGURE 2 Morpheus 3D image volume analysis: Superimposing the baseline with the first, third, and sixth sessions revealed an increase in volume in the mid-face and cheek areas and a decrease in volume in the lower face.

TABLE 1 Changes in facial volume and cheilion length before and after the first, third, and sixth treatment sessions.

	Baseline		After the first session		After the third session		After the sixth session	
	Right	Left	Right	Left	Right	Left	Right	Left
Mid-face (mL)	221.31	227.72	223.41	227.17	224.72	229.79	229.58	231.70
Lower-face (mL)	100.45	101.77	99.50	101.02	98.68	100.68	94.88	97.26
Cheeks (mL)	28.32	33.16	28.81	33.50	28.98	33.18	30.72	35.88
Midline to cheilion (mm)	26.1	28.0	29.0	28.7	28.1	29.4	30.4	31.2

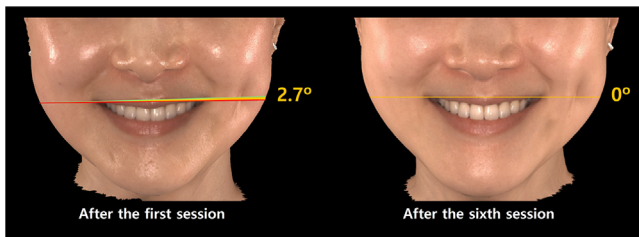


FIGURE 3 Comparison of the cheilions after the first and sixth treatment sessions. The angle between the line connecting the cheilions and the horizontal line connecting the nose alars decreased from 2.7° in the first session to 0° in the sixth session.

decreased on both sides after the first and third sessions, with the right showing a slightly higher reduction. After the sixth session, both sides exhibited significant reductions, with an increase in muscle contraction on the right side. After treatment completion, cheek volume increased by 8.48% on the right and 8.21% on the left (Table 1).

We observed significant improvement in mouth corner asymmetry during smiling. Specifically, when comparing the first and sixth treatment sessions, the horizontal line connecting both cheilions decreased from approximately 2.7° to 0° relative to the line connecting both nose alars (Figure 3). Additionally, the distance from the midline to the cheil-

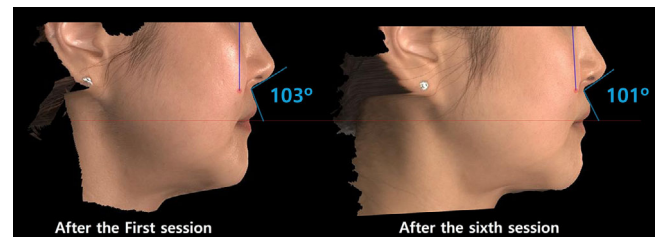


FIGURE 4 Comparison of the nasolabial angle after the first and sixth treatment sessions. The nasolabial angle decreased from 103° after the first session to 101° after the sixth session.

ions increased by 4 mm on the right and 3 mm on the left, and the nasolabial angle decreased by about 2°, enhancing the eversion of the upper lip (Figure 4).

Post-treatment, the right side exhibited increased muscle contraction, leading to a more symmetrical smile. The patient noted easier movement on the right side while smiling and a more balanced expression. She expressed satisfaction with the increased volume in the central facial area, which gave a fuller, more youthful look. One month later, she maintained a stable smile with no recurrence.

To the best of our knowledge, this is the first report of EMFACE treatment for correcting asymmetric smiles. The treatment not only

enhanced muscle contraction for facial symmetry but also offered natural volume augmentation. EMFACE holds promise for lifting, volume enhancement, and non-invasive aesthetic improvements without injections. It provides a safe and effective alternative for various facial concerns.

ACKNOWLEDGMENTS


The funding for this research was provided by the National Research Foundation of Korea (NRF) grant funded by the Korean government [grant number MEST, NRF-RS-2023-00279373]. The authors are grateful for their financial support, which enabled us to conduct this study.

CONFLICT OF INTEREST STATEMENT

The authors have all considered the conflict of interest statement included in "Author Guidelines." To the best of our knowledge, no aspect of the authors' current personal or professional life might significantly affect the views presented on this manuscript. The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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