

Treatment Protocol on Using Microfocused Ultrasound with Visualization for Skin Quality Improvement: The Korean Experience

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Summary: Facial skin quality profoundly influences an individual's perceived appearance and is an important aspect of facial rejuvenation. Facial pore enlargement is one of the most common concerns among Asian individuals that adversely impacts perceived skin surface evenness and affects overall skin quality. One of the major causes of enlarged pores is facial skin laxity. Microfocused ultrasound with visualization (MFU-V; Ultherapy; Merz North America, Inc., Raleigh, N.C.) is indicated for lifting and tightening of the face and neck, and improving the appearance of wrinkles on the décolletage. In addition, it is useful for addressing several aspects of facial rejuvenation, including facial pores, skin laxity, skin unevenness, etc., but there is limited literature on these applications. Thus, we present our proposed MFU-V treatment protocol for achieving a harmonious outcome for attractive skin, along with practical strategies for its application, illustrated in patients presenting with enlarged pores as their main concern. Drawing on our collective experience in using MFU-V for facial rejuvenation and the recently published skin quality framework that advocates addressing interrelated attributes of skin quality for optimal outcomes, we developed a treatment protocol for improving skin quality using MFU-V. This MFU-V treatment protocol reliably improves overall skin quality in patients presenting with enlarged pores, through MFU-V's effects on skin lifting and tightening, and consequent improvement in facial pores and skin texture. This treatment protocol can be readily used as part of a multimodal layering approach to yield successful outcomes in patients with various facial skin concerns. (*Plast Reconstr Surg Glob Open* 2023; 11:e5029; doi: 10.1097/GOX.0000000000005029; Published online 26 May 2023.)

Facial skin quality has a prominent influence on the overall perception of an individual's appearance and is an important aspect of facial rejuvenation.^{1,2}

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The overall perception of skin quality is affected by various attributes, such as skin firmness, skin surface evenness, skin tone evenness, skin glow, etc., many of which are interrelated.^{1,2} A common aesthetic concern among Asian individuals is enlarged facial pores, which adversely impacts perceived skin surface evenness and affects overall skin quality.^{1,2} One of the leading causes of enlarged pores is facial skin laxity.³

Available treatments for enlarged pores include oral antiandrogens, topical creams, lasers, radiofrequency, ultrasound devices, etc.⁴ Depending on the causative factors, a single or combined treatment approach may be necessary to address the concern.⁴ Microfocused ultrasound with visualization (MFU-V; Ultherapy; Merz North America, Inc. Raleigh, N.C.) is widely regarded as the gold standard for nonsurgical lifting and tightening of lax skin.⁵ MFU-V delivers microfocused ultrasound

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waves to the desired treatment areas to create thermal coagulation points, which results in the production of new collagen and elastin, and tissue remodeling to increase elasticity.⁶ MFU-V is indicated for lifting and tightening of the face and neck and improving the appearance of wrinkles on the décolletage.⁷ In addition, it is useful for improving several aspects of skin quality, including facial pores, skin laxity, skin evenness, etc., but there is limited literature on these applications.^{2,3,8,9} Thus, we present our proposed MFU-V treatment protocol for achieving a harmonious outcome for attractive skin, along with practical strategies for its application, illustrated in patients presenting with enlarged pores as their major concern.

Two recently published consensus articles on facial skin quality provided a framework for practitioners seeking to develop a customized treatment plan to achieve harmonious results.^{1,2} These articles advocate addressing interrelated attributes of skin quality (as opposed to isolated attributes) for optimal outcomes.^{1,2} Drawing on the published framework and our collective experience in using MFU-V for facial rejuvenation, we developed a treatment protocol for improving skin quality using MFU-V (Fig. 1). We have collectively treated close to 150 patients over the course of 3.5 years. We recommend delivering 25 treatment lines per 2.5 cm × 2.5 cm square (ie, 100 lines per cheek) to the deep dermis using a 10-MHz/1.5 mm transducer at a setting of energy level 2 (0.18 J), focusing on the areas where the pores are most noticeable. Avoid the medial part of nasolabial fold to ensure proper contact and even coupling of the transducer with the treatment area. Treatment should be delivered in at least two paths or in a cross-hatched pattern to minimize patient discomfort and to prevent excessive stacking.

Examples of the expected aesthetic outcomes 3 months after applying the treatment protocol are illustrated in Figure 2. (See figure, Supplemental Digital Content 1, which presents the before-and-after photographs of a 50-year-old woman, <http://links.lww.com/PRSGO/C588>; See table, Supplemental Digital Content 2, which illustrates the number of pores at baseline and after treatment, <http://links.lww.com/PRSGO/C589>.)

Takeaways

Question: How can microfocused ultrasound with visualization (MFU-V) be used for skin quality improvement?

Findings: Drawing on their collective experience with MFU-V and the published skin quality framework that advocates addressing interrelated skin quality attributes for optimal outcomes, the authors developed a treatment protocol for improving skin quality using MFU-V. In their experience, this MFU-V treatment protocol reliably improves overall skin quality in patients with enlarged pores, through MFU-V's effects on skin lifting and tightening, and consequent improvement in facial pores and skin texture.

Meaning: This protocol can be readily used as part of a multimodal layering approach to yield successful outcomes in patients with various facial skin concerns.

(<http://links.lww.com/PRSGO/C589>.) The patients were treated in accordance with the principles outlined in the Declaration of Helsinki. The number of pores [as assessed by Morpheus (Morpheus Co. Ltd., Gyeonggi-do, Republic of Korea) or MarkVu (PSI Plus Co. Ltd., Gyeonggi-do, Republic of Korea)] declined 3 months after treatment, with statistically significant reductions from baseline observed for both the left ($P = 0.018$) and right ($P = 0.017$) cheeks (Fig. 2; See figure, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/C588>; See table, Supplemental Digital Content 2, <http://links.lww.com/PRSGO/C589>). The pore size (assessed using a pore grading scale 0–6)¹⁰ reduced by two grades after treatment (Fig. 2). Using the global aesthetic improvement scales (GAIS), both physician and patient rated the overall aesthetic appearance as “very much improved” after treatment. (See figure, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/C588>). We noted clinical improvement in global appearance with perceived skin surface evenness and skin tightening from the photographs 3 months after treatment (Fig. 2; See figure, Supplemental Digital Content 1, <http://links.lww.com/PRSGO/C588>).

Treatment map	Design four 2.5 cm X 2.5 cm squares on areas where the pores are the most noticeable
	Design the squares on the lower part to the lateral side. Avoid the medial part of nasolabial fold to ensure proper contact and even coupling of the transducer with the treatment area.
Target layer	Deep dermis
MFU-V settings	10-MHz/1.5 mm transducer Energy level 2 (0.18J) 100 lines/cheek (25 lines/square)
	Treat in at least 2 paths or in a cross-hatched pattern to reduce patient discomfort and to prevent excessive stacking.

MFU-V: microfocused ultrasound with visualization

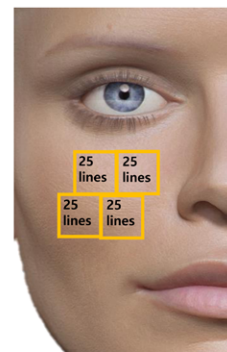


Fig. 1. Proposed MFU-V treatment protocol for skin quality improvement. MFU-V indicates microfocused ultrasound with visualization.

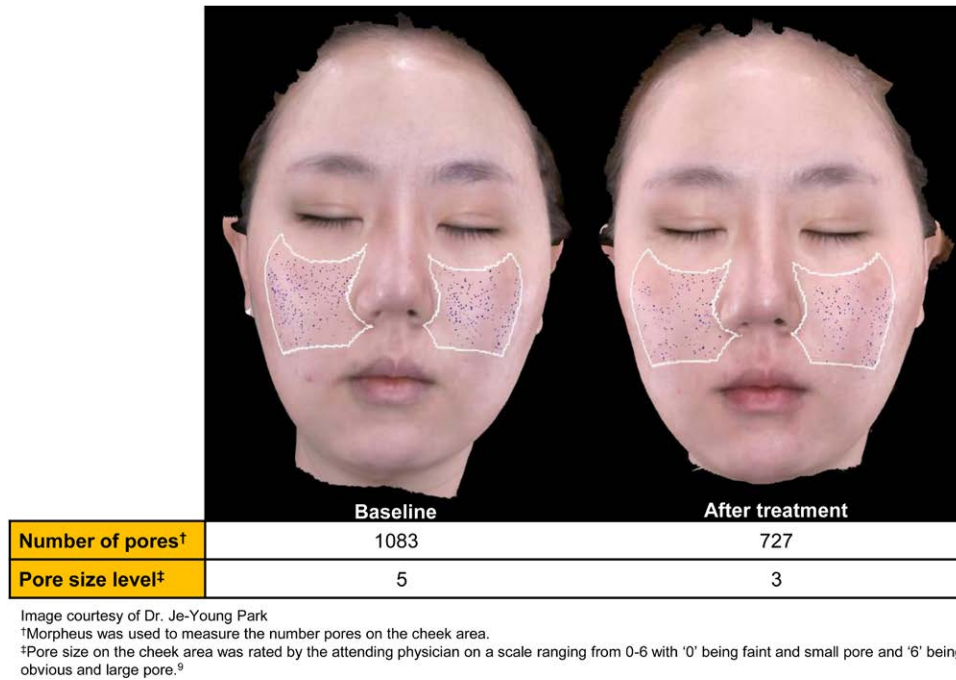


Fig. 2. Aesthetic outcomes after applying the treatment protocol. A 30-year-old woman at (A) baseline and at (B) 3 months after treatment. Image courtesy of Dr. Je-Young Park. †Morpheus was used to measure the number of pores on the cheek area. ‡Pore size on the cheek area was rated by the attending physician on a scale ranging from 0 to 6 with "0" being faint and small pore and "6" being obvious and large pore.¹⁰

In our experience, applying this treatment protocol reliably results in global improvement in skin quality in patients presenting with enlarged pores. MFU-V exerts its effects via lifting and facial skin tightening, resulting in reduction in the number of pores and pore size, improved skin surface evenness, and improvement in global appearance. These observations affirm the recommended framework for holistic skin quality improvement. In our experience, there have been no serious side effects. Common side effects include mild edema and mild pain, which resolved spontaneously within hours to a few days after treatment. We proposed practical strategies for applying the treatment protocol, which included suitable patients, tips for administering treatment, interval for maintenance treatment, and other considerations. The details are summarized in [Figure 3](#). Practitioners can leverage this information to select suitable patients and optimize the treatment protocol for consistent and successful results. As with any treatment, practitioners should be familiar with the product information,⁷ including contraindications, precautions, side effects, and operating instructions before administering the treatment.

Recent consensus articles on facial skin quality stressed the importance of considering interrelated attributes in the treatment plan to achieve harmonious and balanced outcomes.^{1,2} Our clinical experience showed that the treatment protocol not only increases perceived skin tightening, but also minimizes facial pores and improves skin texture. These outcomes collectively lead to improvements in overall skin quality and global appearance. These

observations are in line with the guidance in recent skin quality papers, which recognize that individual treatment modalities can produce positive effects on more than one attribute.^{1,2} It is widely appreciated that a single modality may not adequately address the presenting concerns and aesthetic goals of all patients.^{1,2} Deficits or changes in facial structure in deeper anatomical layers can also affect the appearance of the skin surface.^{1,2} Practitioners should evaluate whether the concerns require resolution through volumization, contouring, and/or biostimulation and customize their treatment plan to meet each patient's needs. The MFU-V protocol can be readily incorporated into a multimodal approach to achieve the desired outcome. Additional recommendations on how to harness the unique properties of each treatment modality (including MFU-V and other modalities) to address specific concerns and additional guidance on the appropriate combination and sequence of administering these modalities to achieve harmonious results are available.^{1,2} In evaluating treatment outcomes, we sought to consider objective as well as subjective aspects of the process. Therefore, we performed evaluations with facial skin analysis systems (Morpheus and MarkVu) commonly used in Korea, alongside standard clinician assessments (GAIS). At present, a range of facial skin analysis systems are used in aesthetic practice, and there are no standard and validated protocols or indicators for assessing skin quality improvement after MFU-V or other treatments using the said devices. However, based on our observations, we recognize several factors that can affect

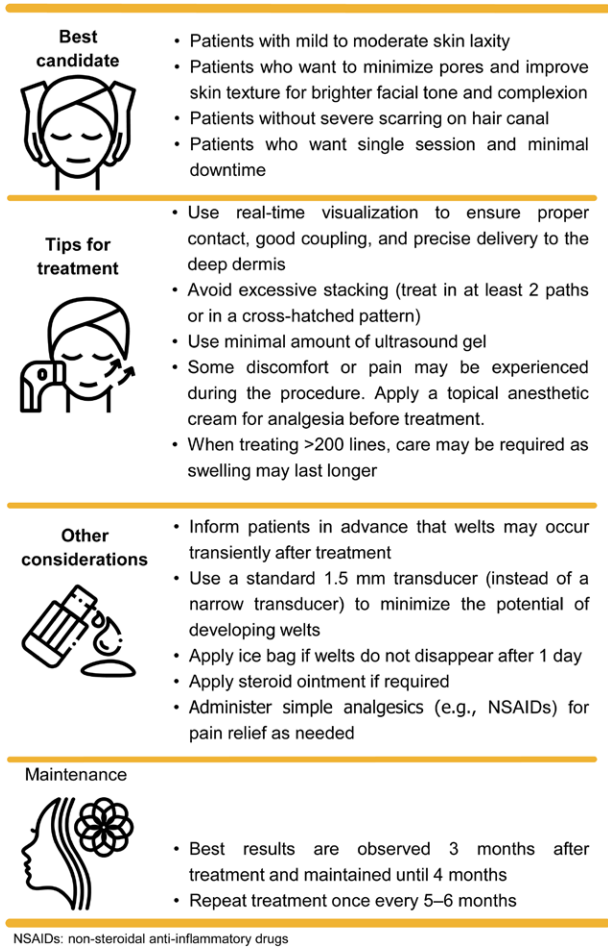


Fig. 3. Practical strategies for applying the protocol for optimal outcomes. NSAIDs: nonsteroidal anti-inflammatory drugs.

objective assessment, including standardization of image capture/analysis settings for the device or software. We suggest adopting some simple measures to improve the consistency of treatment evaluation. Besides ensuring that device and analysis software settings are carefully recorded and reproduced across evaluation sessions for a given patient, it may be useful to include an untreated control site in evaluations. Together with blinded review, which could also be applied to GAIS, this would provide greater confidence that the observed changes are attributable to the treatment being evaluated.

In our experience, the MFU-V treatment protocol reliably improves overall skin quality in patients presenting with enlarged pores, through MFU-V's effects on skin lifting and tightening, and leads to subsequent improvements in facial pores and skin texture. This treatment protocol

can be readily incorporated as part of a multimodal layering approach to yield successful outcomes in patients with a variety of facial skin concerns.

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DISCLOSURE

All authors have no financial interest to disclose in relation to the content of the article.

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