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RESEARCH ARTICLE

THE TREATMENT OF DILATED FOLLICULAR ORIFICES, DEPRESSIVE ACNE SCARS AND FACIAL WRINKLES USING A 785nm PICOSECOND LASER

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ABSTRACT

Laser resurfacing, mechanical resurfacing and chemical peels for dilated follicular orifices (DFO), depressive acne scars and facial wrinkles may provoke a downtime including purpura and crust, and side effects such as postinflammatory hyperpigmentation (PIH), mottled hypopigmentation and scarring. To investigate the efficacy and safety of a 785nm picosecond laser treatment for DFO, depressive acne scars and facial wrinkles, this study was performed. Six Korean patients with DFO, seven Korean patients with depressive acne scars and seven Korean patients with facial wrinkles were treated with a 785nm picosecond laser at a 2-week interval for 10 treatment sessions. The parameters were a spot size of 4 mm, a fluence of 0.7 J/cm², a pulse duration of 300 picoseconds and a pulse rate of 5Hz with 3 passes including 3000 shots by a sliding technique over the entire face. At the week of the final treatment, six patients with DFO, seven patients with depressive acne scars and seven patients with facial wrinkles were achieved the good improvement (more than 50% but less than 75%) without any side effects such as purpura, crust, PIH, mottled hypopigmentation and scarring. A 785 nm picosecond laser treatment is a safe and effective method without side effects for DFO, depressive acne scars and facial wrinkles.

Key words: DFO, Depressive acne scars, Facial wrinkles, 785nm picosecond laser.

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INTRODUCTION

Photoaging and skin disorders such as acne, sebaceous hyperplasia, DFO, solar lentigo, seborrheic keratosis and pigmentary disorder can all contribute to skin irregularities on the face. In addition, skin may lose tone, feel less tightening and lose the healthy glow that is evident in younger skin (Fisher, 2002 and Hur, 2017). Different treatment modalities are available to treat the different aspects of skin damage. Laser resurfacing, Dr. Hoon Hur's Golden Parameter Therapy (GPT), Dr. Hoon Hur's Optimal Melanocytic Suicide-2 (OMS-2) Parameter Therapy, mechanical resurfacing and chemical peels can improve the appearance of DFO, acne scars, facial wrinkles, solar lentigo, seborrheic keratosis and pigmentary disorder (Tanzi, 2003; Fife, 2009 and Hur, 2017). These treatments can provoke the downtime including purpura and crust, and side effects such as PIH, mottled hypopigmentation and scarring. And the treatment of these skin irregularities without side effects such as purpura, crust, PIH and scarring is very difficult (Tanzi, 2003 and Fife, 2009). To investigate the efficacy and safety of a 785nm picosecond laser treatment for DFO, depressive acne scars and facial wrinkles, this study was performed.

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MATERIALS AND METHODS

Six Korean patients with DFO (age range: 27-48 years old, mean age: 32.4 years old), seven Korean patients with depressive acne scars (age range: 28-37 years old, mean age: 31.3 years old), and seven Korean patients with facial wrinkles (age range: 51-72 years old, mean age: 65.6 years old) participated in this study. All of 20 patients were clinically diagnosed and had no significant medical or familial history. After obtaining written informed consent, the lidocaine and prilocaine 5% eutectic mixture of topical anesthetics (EMLA cream 5%, AstraZeneca AB, Sodertalje, Sweden) was used 30 minutes under occlusion before the laser treatment. All of the 20 patients were received 10 treatment sessions of a 785nm picosecond (Picoway Laser, Syneron-Candela, USA) at a two-week interval with a spot size of 4 mm, a fluence of 0.7 J/cm², a pulse duration of 300 picoseconds and a pulse rate of 5 Hz with 3 passes including 3000 shots by a sliding technique over the entire face. After the laser treatment, the entire face was immediately cooled with ice packs, and the patients were instructed to use a broad-spectrum sunscreen to the entire face daily throughout the treatment period. The patients were photographed on the day of treatment and 4 weeks after the final treatment, and were evaluated with standardized digital photographs using a Canon Camera G11 (Japan). The physician's clinical assessment for the degree of improvement

of the patients (mean score of two investigators who did not attend the treatment) was also carried out 1 month after the last session and reported as percentage resolution as follows: poor (0-25% improvement), fair (26-50% improvement), good (51-75% improvement), excellent (76-95% improvement) and

complete (96-100% improvement) by analyzing the clinical photographs of patients. The patients were asked to notify immediately if any pain, discomfort or side effects occurred during each treatment.



Fig.1. Multiple dilated follicular orifices on the face (Before treatment)



Fig. 2. A good improvement of dilated follicular orifices (After treatment)



Fig. 3. Multiple dilated follicular orifices on the face (Before treatment)



Fig.4. A good improvement of dilated follicular orifices(After treatment)



Fig.5. Multiple dilated follicular orifices on the face(Before treatment)



Fig.6. A good improvement of dilated follicular orifices (After treatment)



Fig.7. Multiple dilated follicular orifices on the face(Before treatment)



Fig.8. A good improvement of dilated follicular orifices (After treatment)

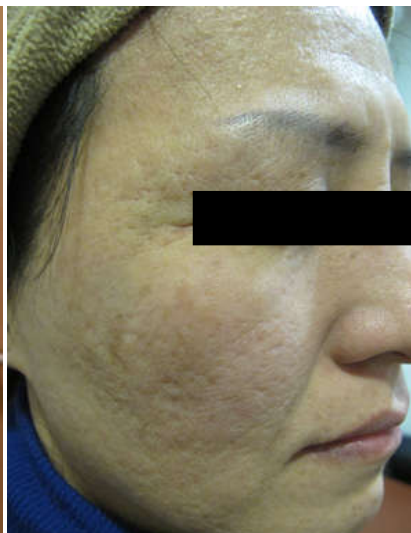


Fig.9. Multiple depressive acne scars on the face(Before treatment)



Fig.11. Multiple depressive acne scars on the face (Before treatment)



Fig.12. A good improvement of depressive acne scars (After treatment)



Fig.13. Multiple wrinkles on the face (Before treatment)



Fig.14. A good improvement of wrinkles (After treatment)



Fig.15. Multiple wrinkles on the face (Before treatment)



Fig.16. A good improvement of wrinkles (After treatment)



Fig.17. Multiple wrinkles on the face (Before treatment)



Fig.18. A good improvement of wrinkles (After treatment)

RESULTS

Six Korean patients with DFO (Fig.1,3,5,7), seven Korean patients with depressive acne scars (Fig.9,11) and seven Korean patients with facial wrinkles (Fig.13,15,17) were enrolled in this study. All of the 20 patients with dilated follicular orifices (Fig.2,4,6,8) or depressive acne scars (Fig.10,12) or facial wrinkles (Fig.14,16,18) were achieved the good improvement (more than 50% but less than 75%). There were no significant side effects including purpura, crust, PIH and scarring except mild pain during the laser treatment.

DISCUSSION

DFO are depressions in the facial skin surface that contain one or more openings to the ducts carrying sweat and oil from their respective eccrine glands and sebaceous glands. As the patients age, depressive acne scars often become more noticeable because the skin loses collagen and elastin, and perifollicular fibrosis occurs around the hair follicle. And facial wrinkles are a kind of fibrosis of the skin due to incorrect repairs of injured collagen fibers and elastic fibers (Fisher, 2002 and Hur, 2017). The multiple factors including increased sebum production, acne, solar damage and loss of skin elasticity with aging that may lead to DFO, acne scars, solar lentigo and facial wrinkles (Fisher, 2002 and Hur, 2017). Laser resurfacing, Dr. Hoon Hur's Golden Parameter Therapy (GPT), Dr. Hoon Hur's Optimal Melanocytic Suicide-2 (OMS-2) Parameter Therapy, mechanical resurfacing and chemical peels can improve the appearance of DFO, acne scars, facial wrinkles, solar lentigo, seborrheic keratosis and pigmentary disorder (Tanzi, 2003; Fife, 2009 and Hur, 2017). These treatments can provoke the downtime including purpura and crust, and side effects such as PIH, mottled hypopigmentation and scarring (Tanzi, 2003 and Fife, 2009). Therefore the treatment for the conditions of skin irregularities without side effects such as purpura, crust, PIH and scarring is very difficult (Fife, 2009 and Ochi, 2017). But the 785nm wavelength of picosecond laser would be preferable to the 1064 nm wavelength of picosecond laser because the shorter wavelength result in more absorbed by the follicular melanin in the follicular melanocyte without epidermal thermal injury (Brauer, 2015 and Habbema, 2012). The 785nm picosecond laser using picosecond pulses creates multiple laser induced optical breakdowns (LIOBs) in the upper papillary dermis and mid dermis while leaving the epidermis intact. Especially, the photomechanical effect due to plasma formation and shock wave can stimulate the platelets, macrophages and fibroblasts with less thermal injury in the dermis (Brauer, 2015 and Habbema, 2012). This mechanism for dermal response without thermal damage is able to stimulate the platelets which secrete platelet-derived growth factor (PDGF), epidermal growth factor (EGF), transforming growth factor-beta1 (TGF-beta1), TGF-beta2 and TGF-beta3 to activate the macrophages. The activated macrophages secrete TGF-beta3 and basic fibroblast growth factor (bFGF) which stimulate the fibroblasts (Shah, 1995 and Hur, 2017). Subsequently the activated fibroblasts produce the extracellular matrix such as natural hyaluronic acid, collagen, elastin and fibronectin which stimulates a healing response. The skin remodeling results in DFO reduction, depressive acne scars reduction, facial wrinkles reduction and skin rejuvenation (Brauer, 2015; Habbema, 2012 and Hur 2017). Also the improvement of depressive acne scar due to microsubcision through photomechanical effect may occur. The mechanism of

microsubcision through photomechanical effect due to plasma formation and shock wave is that the follicular melanin chromophores absorb the photons of a 785nm picosecond laser light and the high melanin-absorbed photons may react on the follicular melanocytes as a primary target, and subsequently this plasma formation and shock wave may microsubcise the fibrosis of scar tissue as a secondary target, therefore result in scar remodeling (Brauer, 2015; Habbema, 2012 and Hur 2017). In this study, six Korean patients with DFO (Fig.1,3,5,7), seven Korean patients with depressive acne scars (Fig.9,11) and seven Korean patients with facial wrinkles (Fig.13,15,17) were received 10 treatment sessions of a 785nm picosecond (Picoway Laser, Syneron-Candela, USA) at a two-week interval with a spot size of 4 mm, a fluence of 0.7 J/cm², a pulse duration of 300 picoseconds and a pulse rate of 5 Hz with 3 passes including 3000 shots by a sliding technique over the entire face. It is possible to deliver sufficient energy to activate the dermal fibroblasts and in the same time salvaging normal background tissue, preventing PIH and scarring from being triggered, and minimizing epidermal damage without inducing purpura and crusts. All of the 20 patients with dilated follicular orifices (Fig.2,4,6,8) or depressive acne scars (Fig.10,12) or facial wrinkles (Fig.14,16,18) were achieved the good improvement (more than 50% but less than 75%). There were no significant side effects including purpura, crust, PIH and scarring except mild pain during the laser treatment. All patients were satisfied with the results of a 785nm picosecond laser treatment without any side effects, including PIH and scarring.

Conclusion

In this study, All of the 20 patients with dilated follicular orifices or depressive acne scars or facial wrinkles were achieved the good improvement (more than 50% but less than 75%). There were no significant side effects including purpura, crust, PIH and scarring except mild pain during the laser treatment. We suggest a 785 nm picosecond laser treatment is a safe and effective method for DFO, depressive acne scars and facial wrinkles.

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