



Treatment of Acne Scars in Asian Skin with Affirm Combined Apex Pulse Technology

Dr. Connia LY Ho

MB,BS, MRCP, FHKCP, FHKAM(Med), Dip. Derm(London)

Specialist in Dermatology

Introduction

Acne is a common disease and has been estimated to affect 95-100% of 16-17 year old boys and 83-85% of 16-17 year old girls. Acne resolves in the vast majority by 23-25 years of age, but 1% of males and 5% of females continue to exhibit acne lesions at 40 years of age.¹⁻⁵

There are many factors that influence the onset of acne and the eventual sequela of acne scarring. There does appear to be a hereditary component to acne, but it also is strongly influenced by external factors.⁶⁻⁷

Acne is highly embarrassing for adolescents. Post-acne scarring is particularly devastating. These scars appear as multiple depressive scars, cause problems cosmetically and impact self-confidence, especially in young people.⁸

Post-acne scars are dermal depressions that are most commonly caused by collagen damage. Many different treatments including chemical peels, surgical excision, punch grafting, dermabrasion, and tissue augmentation with a variety of filler substances, have been used to treat post-acne scars with varying degrees of success.⁹⁻¹⁰

Recontouring of post-acne scars with CO₂ and Er: YAG lasers have become popular over the last decade. Though more effective than other methods due to its precision with depth control and variable methods of surface cutting, laser resurfacing has an extended post-laser recovery period and the potential risks of delayed wound healing, pigmentary changes, and scarring.^{8, 11}

These procedures have not been widely accepted in Asian countries due to the increase in post inflammatory hyperpigmentation. In fact, these complications and downtime can sometimes last more than one year. Some post inflammatory hyperpigmentation may be permanent. For these reasons Asian patients have been less willing to undergo ablative laser skin resurfacing.¹²⁻¹³

In general, Asian skin types have a tendency to develop pigmentation and other complications with most conventional skin rejuvenation procedures.

In a previous study conducted at the National Skin Center in Singapore a 1450 nm nonablative diode laser was found to result in clinical improvement of atrophic acne scars in Asian skin types after 4-6 treatments with a fluence of 11-12 J/cm².

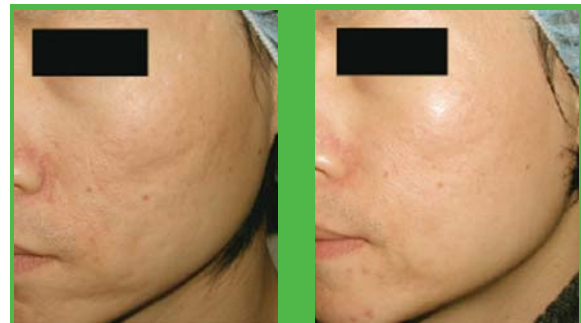


Figure 1 -Improvement of left lateral acne scars, before (left) and post-treatment (right)

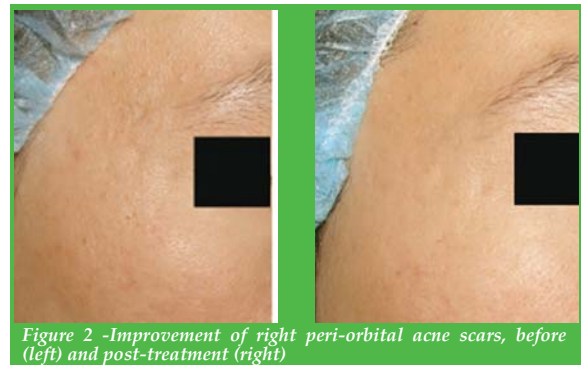


Figure 2 -Improvement of right peri-orbital acne scars, before (left) and post-treatment (right)

However, in this study the side effect of postlaser hyperpigmentation was significant. The possible contributing factor to this postlaser hyperpigmentation may be the high fluence used in the aforementioned study. Pain experienced during treatment was also significant in this study despite the use of pre-treatment anesthetic cream and cryogen precooling.¹⁵

It is for these reasons that novel treatments for acne scars in Asian skin types have been sought.¹⁴

Methods

The objective of this study is to evaluate the performance of the Affirm, 1440 nm Nd: YAG laser device with Combined Apex Pulse (CAP) technology in the treatment of ten subjects of Asian skin type presenting with acne scars.

Subjects were evaluated and photographed prior to the initiation of treatment, prior to each subsequent



treatment, and at one and three months following the final treatment. Subjects received five treatments at 3-4 week intervals. Prior to treatment the skin was cleaned and any makeup was removed.

Subjects were treated using the Affirm laser system. The strong absorption of the 1440 nm wavelength makes the Affirm a safe and effective treatment of the area of solar elastosis (100-300 microns) and deeper penetration into the tissue is rendered unnecessary. The CAP array in the 1440 nm Nd:YAG Affirm laser system was developed to combine the effects of both high-fluence aggressive heating resulting in collagen remodeling and the mechanism of low-fluence low level heating resulting in collagen stimulation.

The CAP array consists of a special lens which creates apexes of high-fluence regions surrounded by low-fluence treatment zones. The high-fluence apexes create a pattern of columns surrounded by low-fluence background heat. This combination improves treatment efficacy while maintaining the existing side effects profile.

The Affirm 1440 nm wavelength was delivered using the 10 mm spot size with the CAP array and a 3 msec pulse duration. Treatment fluences ranged from 2.5-4.0 J/cm², and 1-2 Hz pulse repetition rate.

Initial subject treatment fluences were 2.5-3.0 J/cm². Treatment fluences increased with each subsequent treatment based upon patient tolerance. Subjects received two treatment passes. All treatments were delivered in conjunction with SmartCool™ (Cynosure, Inc., Westford, MA) cold-air cooling, with a fan speed of 3 or 4. No additional anesthesia was required. The CAP array tip requires full contact with the skin for safe and effective treatment. When treating acne scars, compression is used to flatten the scar, for more direct delivery of the laser energy to the area. Subjects could resume normal activities following treatment.



Figure 3 -Improvement of left lateral acne scars, before (left) and post-treatment (right)



Figure 4 -Improvement of right peri-orbital scars, before (left) and post-treatment (right)



Figure 5 - Improvement of left lateral acne scars, before (left) and post-treatment (right)

Ten subjects participated in this investigation. Nine of the ten subjects completed all five treatment procedures. The remaining one patient completed her fourth treatment. All ten subjects have returned for their one-month post-treatment evaluation. As of 7 May 2007 two patients have returned for their three-month post-treatment evaluation.

Results

While evaluating the treatment of ten subjects using the Affirm laser system at 1440 nm wavelength an improvement in acne scars was noted.

Improvement in enlarged pores, dyschromia, post inflammatory hyperpigmentation (PIH), skin color, pigmentation and skin texture also was noted. Patients tolerated the procedures well and were very satisfied with the outcome.

Of the ten subjects treated eighteen distinct treatment areas were evaluated. Treatment area photos were graded according to the following scale: 0 = no improvement, 1 = mild improvement, 2 = moderate improvement, 3 = good improvement, 4 = excellent improvement. Of these twenty seven treatment areas all showed some improvement. No treatment areas showed less than a 25% improvement. Seven treatment areas showed a 25-50% improvement, seven showed a 50-75% improvement and four showed a 75-100% improvement. The overall average improvement for all treatment areas was 50-75%.

Pain experienced during the procedure was minimal to moderate. Patient discomfort was evaluated on a scale of 0-5. Only one patient reported experiencing discomfort of 4 during just one of the treatments. Patients reported an average discomfort level of 2.3. No topical anesthesia was used during treatments.

Postlaser hyperpigmentation was minimal with many patients seeing improvement in existing post inflammatory hyperpigmentation.

Discussion

Treatment with the Affirm laser system at 1440 nm wavelength is an effective treatment for acne scars. Improvement can also be observed in enlarged pores, dyschromia, postinflammatory hyperpigmentation,



skin color, pigmentation and skin texture. Treatment with the Affirm laser system at 1440 nm wavelength may result in post treatment erythema that may last up to 24 -48 hours. Patients may apply a mineral based make-up post treatment and resume activities. The procedure is well tolerated by patients.

Theory

The most general simplified morphology of a depressed acne scar is a region of normal epidermis pulled down by a compacted nodule consisting mostly of damaged collagen. The depth of the compacted nodule is determined by the depth and subsequent re-epithelialization of the original acne inflammation. The compacted nodules closer to the surface present more cosmetic issues than deeper nodules. Prior studies have shown that CO₂ and uniform spot 1450 nm laser can improve the appearance of depressed acne scars, although these modalities are associated with various side effects¹⁶. The 1440 nm wavelength of the Affirm laser has similar depth of penetration as the 1450 nm uniform spot or the ablative depth of the CO₂ laser. The main advantage of the Affirm is that using CAP technology it creates background uniform heating and precisely tailored columnar damage and promotes collagen rejuvenation without the side effects. As a result of the treatment, damaged collagen in the compacted nodules is partially or totally replaced and the appearance of the depressed acne scars is alleviated or eliminated.

Conclusion

The Affirm with CAP technology provides good improvement in acne scars, as well as enlarged pores, dyschromia, post inflammatory hyperpigmentation, skin color, pigmentation and skin texture, and offers significant practical advantages over other conventional treatments including traditional laser resurfacing.

References

1. Bruton JL, Cunliffe WJ, Stafford I, Shuster S. The prevalence of acne vulgaris in adolescence. *Br J Dermatol* 1971; 85:119-26.
2. Munro-Ashman D. Acne vulgaris in a public school. *Trans St John's Hosp Dermatol Soc* 1963; 49:144-8.
3. Rademaker M, Garioch JJ, Simpson NB. Acne in Schoolchildren: No longer a concern for dermatologists. *Br Med J* 1989; 298:1217-9.
4. Bloch B. Metabolism, endocrine glands and skin disease, with special reference to acne vulgaris and xanthoma. *Br J Dermatol* 1931; 43:61-87.
5. Cunliffe WJ, Gould DJ. Prevalence of facial acne vulgaris in late adolescence and in adults. *Br Med J* 1979; 1:1109-10.
6. Goulden V, McGeown CH, Cunliffe WJ. The familial risk of adult acne: A comparison between first-degree relatives of affected and unaffected individuals. *Br J Dermatol* 1999; 141:297-300.
7. Hecht H. Hereditary trends in acne vulgaris. *Dermatologica* 1960; 121:297-307.
8. Koo SH, Yood ES, Ahn DS, Park SH. Laser Punch-Out for Acne Scars. *Aesth Plast Surg* 2001; 25:46-51.
9. Alster TS, West TB. Treatment of scars: A review. *Ann Plast Surg* 1997; 39:418-32.
10. Alster TS, Tanzi EL. Hypertrophic scars and keloids: Etiology and management. *Am J Clin Dermatol* 2003; 4:235-43.
11. Nanni CA, Alster TS. Complications of CO₂ laser resurfacing: An evaluation of 500 patients. *Dermatol Surg* 1998; 24:315-20.
12. Shinnbashi T. Laser resurfacing with Er:YAG laser. *Jpn J Plast Surg* 1999; 42:845-55.
13. Yamashita R. Laser skin resurfacing with the Ultrapulse carbon dioxide laser. *Jpn J Plast Reconstr Surg* 1999; 42:833-44.
14. Negishi K, Tezuka Y, Nobuharu K, Wakamatsu S. Photorejuvenation for Asian skin by intense pulsed light. *Dermatol Surg* 2001; 27:627-32.
15. Chua SH, Ang P, Khoo L, Goh CL. Nonablative 1450-nm diode laser in the treatment of facial atrophic acne scars in type IV to V Asian skin: A prospective clinical study. *Dermatol Surg* 2004; 30:1287-91.
16. Weiss R, Gold M, Bene N, Biron J, Munavalli G, Weiss M, Beasley K. Prospective clinical evaluation of 1440-nm laser delivered by microarray for treatment of photoaging and scars. *J Drugs Dermatol* 2006; 5(8): 740-744.